University of Alberta

School Functioning of Children with Autism Spectrum Disorders:

A Correlational/Comparative Study

by

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Abstract

Recently, there has been a call for the identification of ecologically valid outcome measures of educational interventions for children with Autism Spectrum Disorders (ASD) (National Research Council, 2001; Shriebman, 1999). This study investigated the validity and utility of one such measure, the School Function Assessment (SFA) through a multi-phase study involving correlational, comparative and evaluative components. The SFA is a criterion-referenced measure that provides information about level of participation in school activities, required levels of supports and performance of school-related functional skills of children with disabilities.

The convergent and discriminant validity of the SFA was examined through a series of correlations with the Vineland Adaptive Behavior Scale: Classroom Edition (VABS-C) and the Maladaptive Behavior Domain of the Interview Edition of the VABS, completed on a group of 24 elementary-aged children with ASD and cognitive delays attending congregated special education classes. For the comparative component of the study comparisons were made on data collected on 15 children with cognitive delays matched on age and daily living skills. The social validity and utility of the SFA was investigated through teacher ratings and brief interviews.

Correlations (*r*) ranging from .57 to .71 obtained on composite and comparable sections provided support for the convergent validity of the SFA with the broad content of the VABS-C, however, little evidence was found for its discriminant validity with the VABS-C, or the Maladaptive Domain of the VABS. Relative to the comparison group, children with ASD were found to have significantly lower levels of social skills, functional communication and safety skills. The SFA was evaluated by teachers as

identifying relevant functional skills and needed supports for children with ASD, however a number of concerns were also identified, in particular the time required for completion.

It was concluded that while the research applications of the SFA should be approached with caution, the SFA appears to have functional utility for programming purposes. The limitations of the study, accompanied by the implications of the findings indicate the need for further investigation of ecologically-based assessment models that are informed by current empirical, theoretical and social developments related to children with ASD.

Acknowledgements

Completing a dissertation has many similarities to running a marathon. In both cases you start out with enthusiasm, high expectations and the desire to perform at your personal best. Near the end those feelings turn to exhaustion, occasional bouts of discouragement and the desire to simply cross the line. In the end you are carried across by determination, the fear of failure and the help and support of others.

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Table of Contents

CHAPTER 1: THE PROBLEM 1

Glossary of Terms 5

CHAPTER 2: REVIEW OF THE LITERATURE 7

Description of Autism 8
Genetics and ASD 10
Neurology and ASD 10
Cognition and ASD 12
Prevalence 15
Long-Term Outcome 17
Educational Intervention 17
Early Intervention Research 18
Outcome Measures in Intervention Research 19
Critique of Outcome Measures 22
Measures of Cognitive or Intellectual Status 25
Developmental Assessments 27
Adaptive Behavior 28
Postintervention Educational Placement 30
New Directions in Assessment 34
Ecological Perspectives on Human Performance 35
Ecologically Based Assessment Models 38
The School Function Assessment 40
Validity and Utility of the SFA 42
Summary of the Literature 45

CHAPTER 3: RATIONALE AND RESEARCH QUESTIONS 48

Introduction 48
Validity of the School Function Assessment 49
Convergent Validity of the SFA 49
Discriminant and Discriminative Validity of the SFA 50
Teachers' Perception of the Appropriateness of the SFA 50
School Functioning of Students With ASD 50

CHAPTER 4: METHODS 52

Participants 52
Recruitment 54
Assessment Procedures 57
Research Design 58
Correlational Component 59
Comparative Component of the Study 64

Evaluative Component 66
Summary of Research Design 67
Instrumentation 68
School Function Assessment 68
Vineland Adaptive Behavior Scale (VABS) 69
Supports and Services Questionnaire 70
Teacher Feedback Rating Scale 71

CHAPTER 5: RESULTS 72

Participants 73
Children With ASD 73
Children With Cognitive Delays Without ASD 74
Teachers 75
Descriptive Measures 75
Adaptive Behavior 76
Maladaptive Behavior 77
School Functioning 78
Convergent and Discriminant Validity of the SFA 82
Convergent Validity 83
Discriminant Validity 85
Summary of Results on the Convergent and Discriminant Validity 89
Comparison of School Functioning 89
Comparability of Groups 90
Comparison of Adaptive Behavior, Maladaptive Behavior, and School Functioning 91
Summary of the Results of the Comparisons 98
Social Validity of the SFA 98
Teacher Ratings of the SFA 99
Results of the Teacher Interviews 100
Summary of Social Validity of the SFA 104

CHAPTER 6: DISCUSSION 105

The Sample 105
Diagnosis 106
Level of Function 107
Convergent and Discriminant Validity of the SFA 107
Comparison of School Functioning 109
Social Validity 115
Limitations 117
Limitations of the Sample 117
Limitations Associated With the Instrumentation 118
Control for Method Variance 119
Control for Response Bias 120
Directions for Future Research 120
Conclusion 122

REFERENCES 126

APPENDIX A: LETTER OF INTENT 135

APPENDIX B: FOLLOW-UP LETTER TO PARENTS AND CONSENT FORM 138

APPENDIX C: FOLLOW-UP LETTER TO TEACHERS AND CONSENT FORM 142

APPENDIX D: INSTRUCTIONS FOR COMPLETING QUESTIONNAIRES 146

APPENDIX E: ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS WITH ASD 149

APPENDIX F: SUPPORTS AND SERVICES QUESTIONNAIRE 151

APPENDIX G: TEACHER FEEDBACK RATING OF THE SCHOOL FUNCTIONING ASSESSMENT 156

APPENDIX H: DIAGNOSTIC INFORMATION ON PARTICIPANTS WITH ASD 158

APPENDIX I: ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS WITH ASD 161

APPENDIX J: DIAGNOSTIC INFORMATION ON PARTICIPANTS WITH COGNITIVE DELAYS WITHOUT ASD 164

APPENDIX K: ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS WITH COGNITIVE DELAYS WITHOUT ASD 166

APPENDIX L: DESCRIPTIVE STATISTICS FOR THE SFA FOR CHILDREN WITH ASD 168

APPENDIX M: DESCRIPTIVE STATISTICS FOR THE SFA FOR CHILDREN WITH COGNITIVE DELAYS 170

APPENDIX N: MEAN NUMBER OF ADAPTATIONS FOR EACH OF THE GROUPS AND LIST OF ADAPTATIONS FROM THE ADAPTATIONS CHECKLIST OF THE SCHOOL FUNCTION CHECKLIST 172

APPENDIX O: BOX PLOT AND HISTOGRAM: AGE 176

APPENDIX P: BOX PLOT AND HISTOGRAM: VABS-C DL 179

APPENDIX Q: BOX PLOT AND HISTOGRAM: MAS 182

APPENDIX R: BOX PLOT AND HISTOGRAM: COGNITIVE/BEHAVIORAL TASK SUPPORTS 185

APPENDIX T: BOX PLOT AND HISTOGRAM: COGNITIVE/BEHAVIORAL TASK PERFORMANCE 188

APPENDIX T: BOX PLOT AND HISTOGRAM: MEMORY AND UNDERSTANDING 191

APPENDIX U: BOX PLOT AND HISTOGRAM: TASK BEHAVIOR/ COMPLETION 194

APPENDIX V: TEACHER INTERVIEW SUMMARIES 197

APPENDIX X: LIST OF ITEMS FROM THE SFA FUNCTIONAL COMMUNCATION SUBTEST 212

List of Tables

Table 1. Examples of Outcome Measures Included in Intervention Studies 21

Table 2. Comparison of Norm-Referenced Assessment Model to Occupation-Centered Assessment 41

Table 3. Description of Criteria for Participation 53

Table 4. Comparable Domains on the School Function Assessment (SFA) and the Vineland Adaptive Behavior Scales (VABS) 60

Table 5. M, SD, and Ranges for the Composite and Domain Scores of the VABS-C for Children With ASD and Children with Cognitive Delays (CD) 76

Table 6. Level of Significance of Maladaptive Behavior Demonstrated by Children With ASD and Children with Cognitive Delays (CD) 78

Table 7. M, SD, and Ranges for the Subscale Scores for Children With ASD and Children With Cognitive Delays Without ASD 79

Table 8. Comparison of Pearson Product Moment Correlation Co-efficients (R) Between the VABS-C Adaptive Behavior Composite and the SFA Composite and the SFA Total for Children With ASD 84

Table 9. Comparison of the Correlations Between the SFA and the VABS-C With Children With ASD and a Combined Group of Children With Learning Disabilities (LD) and Cerebral Palsy (CP) as Reported by Hwang et al. (2002) 85

Table 10. Correlational Matrix for Composite and Comparable Sections of the VABS-C and the SFA 86

Table 11. Comparison of Pearson Product Moment Correlation Co-efficients (*r*) Between Comparable Domains of the VABS-C and SFA 88

Table 12. Comparison of Participants With ASD and Children With Cognitive Delays (CD) Without ASD on the Matching Variables 90

Table 13. M, SD, and Results of T-Tests on the VABS-C, the Maladaptive Domain of the VABS Interview Edition, and the SFA for the Groups With ASD and With CD Without ASD 93

Table 14. M, SD, and Results of T-Tests for the Cognitive-Behavioral Tests of the SFA for Children With ASD and Children With CD 97

Table 15. M, SD, and Results of T-Tests for the Cognitive-Behavioral Tests of the SFA for Children With ASD and Children With CD With Outlier Removed 97

List of Figures

Figure 1. Comparison of Clinical Significance Levels. 94

Figure 2. The Cumulative Teacher Ratings for Each of the Subscales..... 100

Figure 3. Teacher Estimation of Time Required to Complete the SFA and VABS-C. 102

CHAPTER 1:

THE PROBLEM

The selection of appropriate and meaningful outcome measures has broad-based relevance for research involving educational interventions for children with disabilities. From an academic perspective, the selection of outcome measures highlights the important issue of external validity, specifically whether the results of empirical investigations generalize outside of the research setting. At the community agency level, identification of appropriate outcome measures has significance for determining the effectiveness of an intervention or program for a particular client in a specific setting. From a public policy perspective, the selection of outcome measures is linked to the provision of appropriate supports and the responsible use of limited resources. Perhaps nowhere are these academic, applied, and public policy concerns as pressing as in the area of educational interventions for children with autism spectrum disorders (ASDs).

Autism is a perplexing disorder that has a profound impact on the lives of those who experience the disability, as well as on the families, schools, agencies, and communities that surround and support the affected individual. In a recent review of the literature McGahan (2001) found that approximately 10%-15% of affected individuals live and work independently, whereas the remainder achieve partial independence or, in the majority of cases, require substantial support. The significance of these long-term outcomes becomes apparent when one considers recent dramatic increases in the prevalence rate from what was once considered an exceedingly rare condition to current estimates of 1 in 165 (Fombonne, 2004).

In light of increasing prevalence rates and poor long-term outcome, it is encouraging that educational intervention appears to have a significant and positive impact on the developmental trajectory of young children with ASD. The most impressive evidence comes from studies of early intensive intervention. Earlier studies suggested that normal intellectual skills and age-appropriate educational functioning were possible for a significant number of children who were involved in early intensive intervention (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). Although these results have not been fully replicated, significant improvements on normative measures of child development continue to appear in the literature (Eikeseth, Smith, Jahr, & Eldevik, 2002; Scheinkopf & Siegel, 1998; Smith, Groen, & Wynne, 2000). As a result, educational intervention has been embraced as the primary means of influencing the long-term outcome for individuals with ASD (National Research Council, 2001).

There is general agreement concerning the value of educationally based interventions, and early intervention in particular, but this agreement is neither unanimous nor unqualified. Many questions about the efficacy of educational intervention for this population remain unanswered. Examples of areas of continuing uncertainty include the relative merits of various theoretical models, the required level of intensity, the necessary program components, the optimum age for intervention, and the responsiveness of various subgroups to different approaches to intervention (Dawson & Osterling, 1997; National Research Council, 2001; Smith, 1999). A critical component of the broad research agenda required to bring some clarity to this area is the need to define and measure truly meaningful outcomes for individuals with autism. The use of norm-referenced outcome measures, including the intelligence quotient (IQ), standardized

language assessments, developmental scales, adaptive behavior scores, and placement in regular classrooms has come under considerable criticism (Schuler, 2001; Wolery & Garfinkle, 2002). These measures have been criticized as lacking the necessary sensitivity, comprehensiveness, and, most important, ecological validity to serve as meaningful indicators of treatment effect (National Research Council, 2001; Schuler, 2001; Wolery & Garfinkle, 2002). Of particular concern is the use of postintervention classroom placement as an indicator of treatment effect.

Postintervention classroom placement is one of the most commonly reported outcome measures in published studies of early intervention (National Research Council, 2001). Although placement in an age-appropriate, regular-education classroom is a highly desirable outcome and one with considerable social validity, the relationship between the type of class in which a child is placed and the effects of intervention is, at best, indirect. Postintervention classroom placement appears to be dependent on factors largely unrelated to intervention, including the pretreatment characteristics of the child, local school policy, and the attitudes of educators involved in the child's program (Eaves & Ho, 1997; National Research Council, 2001; Wolery & Garfinkle, 2002). In contrast to classroom placement, however, improvements in important and well-defined aspects of school functioning appear to constitute both measurable and meaningful outcomes of educational interventions. Unfortunately, there is a paucity of literature describing the postintervention school functioning of children with ASD. This gap in knowledge is almost certainly related to the fact that there are few instruments or processes that are specifically designed to provide this information. Consequently, the investigation of

measures that could potentially provide a detailed and accurate picture of the child's ability to function in this important environment is a worthwhile research endeavor.

This study was designed to respond to recent calls for ecologically valid assessment of the child's ability to function in critical environments (Schreibman, 1999; Wolery, 2000b). To achieve this goal, I have explored the validity and utility of a new measure that purports to provide detailed information about the child's functioning within school settings. The School Function Assessment (Coster, Deeney,Haltiwanger, & Haley, 1998) has been described as a "criterion-referenced assessment that measures a student's current level of performance related to a continuum of educationally relevant functional skills" (Hwang, Davies, Taylor, & Gavin, 2002, p. 49). The SFA provides information on the child's participation in activities both within and outside the classroom, required adaptations and assistance, and school-related functional skills. Because the SFA has the advantage of measuring specific aspects of school function within the classroom, it may provide some indication of the "acquisition of competence in natural contexts" (National Research Council, 2001, p. 228) as a truly meaningful outcome of educational intervention for children with ASD.

The primary objective of the study was achieved through a partial replication of a recent investigation of the SFA completed by Hwang et al. (2002). In that study the construct validity of the SFA was explored through the concurrent administration of the Vineland Adaptive Behavior Scale (Sparrow, Balla & Cicchetti, 1984) and the SFA to children with cerebral palsy and learning disabilities and to a comparison group of children without disabilities. The discriminative validity of the SFA was explored through a "Known Groups" method in which the children were classified into each of the

diagnostic groups based on the pattern of scores obtained on the SFA. In the present study the SFA and the Vineland Adaptive Behavior Scale: Classroom Edition (VABS-C) were administered to children with ASD who attended congregated special-education programs and a comparison group of children with mental retardation. This investigation also extended Hwang et al.'s study by measuring teachers' perception of the appropriateness of the SFA for children with ASD, thus providing an indication of both the social and the ecological validity of the instrument.

The design of the study allowed me to provide a detailed description of the school functioning of children with ASD relative to that of other students with disabilities who attended congregated special-education classes. Following the advice of Kraijer (2000), I used the Self-Help domain of the VABS to establish the functional capacities of the two groups in areas that do not appear to be affected by ASD. This approach permitted me to describe patterns of school functioning that are specific to autism. To date, there has not been a systematic description of the functional skills, the level of participation in common classroom activities, and the supports and accommodations required by a group of children with ASD. This information has important implications for the design and selection of interventions targeted at improving the child's ability to function in one of the most important criterion environments for all children—the school.

Glossary of Terms

Adaptive behavior: Adaptive behavior refers to the effectiveness with which or the degree to which the individual meets standards of personal independence and social responsibility (Grossman; as cited in Reschley, 1990).

Autism spectrum disorders (ASD): ASD refers to a group of disorders that share core areas of deficits including a disruption in reciprocal social interaction, impaired verbal and nonverbal communication, and restricted and repetitive patterns of behavior, interests, and activities (American Psychiatric Association, 1994). The *DSM-IV* includes five specific disorders within the autistic spectrum: Rett's syndrome, autistic disorder, pervasive developmental disorder: not otherwise specified (PDD: NOS), Asperger's disorder, and childhood disintegrative disorder. These disorders are sometimes collectively referred to as the pervasive developmental disorders (PDDs).

Ecological validity: In the context of the current study, ecological validity is defined as the extent to which the test samples behaviors required in the natural environment and the scores measure behaviors in the setting in which they are required (Silver, 2000).

School function: School function refers to the student's ability to perform important functional activities that support or enable participation in the academic and related social aspects of a school program (Coster, Deeney, Haltiwanger, & Haley, 1998).

CHAPTER 2:

REVIEW OF THE LITERATURE

> There is only one treatment that has passed the test of time and is effective for all children, autistic or normal, that is, structured educational programs geared to the person's developmental level of functioning. (Freeman, 1997, p. 646)

Within the realm of educational programs for children with disabilities, early intervention for children with ASDs appears to be a success story. Relative to the modest outcomes associated with early intervention provided to children with heterogeneous disabilities, the evidence suggests that early, intensive intervention with children with ASD can result in gains in excess of predictions based on the child's pre-intervention level of function and developmental trajectory (Guralnick, 1998). Improved developmental outcomes associated with this type of intervention include significant increases in IQ and language scores, a reduction of autistic symptoms, positive changes on measures of social behavior, and improved school placements (Dawson & Osterling, 1997; McGahan, 2001; National Research Council, 2001). Results such as these have led to a general consensus on the value of educational programs for children with ASD, regardless of the child's developmental level (Freeman, 1997). Despite the widespread support for the value of educational intervention for children with ASD, questions have been raised about the validity and adequacy of norm-referenced measures that have traditionally been used to demonstrate the efficacy of this type of intervention.

This review will address a number of issues associated with the outcomes used in studies of early intervention, with a particular focus on the use of postintervention educational placement as an outcome measure. To appreciate the importance of

educational intervention for individuals with ASD, it is useful to understand the origins of the disorder and the potential impact on the individual and society. Thus, this review will begin with a brief description of the core characteristics of ASD and an overview of recent genetic, neurological, and cognitive research. The impact on society and the individual will be described with reference to current prevalence estimates and a description of long-term outcomes.

The review will also provide a brief overview of the literature on early intervention research with children with ASD, including a critical review of outcome measures commonly used in studies of early intervention with these children. This section will include a synthesis of the recommendations related to the design and use of outcome measures in future research that have appeared in recent literature. The final section of this review will present an argument for approaching the definition of outcomes and the selection of outcome measures from a top-down perspective as conceptualized in the occupation-based model that Trombly (1993) described and Coster (1998) adapted to school functioning.

Description of Autism

There appears to be general agreement that autism is a developmental disorder of neurobiological origin manifested within the first years of life (Fisher et al., 1999; National Research Council, 2001). Autism is a behaviorally defined syndrome that is characterized by deficits in three core areas of functioning: reciprocal social interaction, impaired verbal and nonverbal communication, and restricted and repetitive patterns of behavior, interests, and activities (American Psychiatric Association, 1994). Associated

behavioral anomalies may include hyperactivity, short attention span, impulsivity, aggression, self-injurious behaviors, odd responses to sensory stimuli, abnormalities associated with eating and sleeping, and difficulty comprehending the environment and the thoughts, emotions, and needs of others (Rapin, 1997). The *DSM-IV* identified five separate diagnoses that fall within the autism spectrum, including autistic disorder, Asperger disorder, pervasive developmental disorder: not otherwise specified, childhood disintegrative disorder, and Rett syndrome. These disorders are differentiated primarily by the range of behavioral anomalies and the extent of the deficits observed in each of the three core areas of functioning that are impacted by ASD.

The autism spectrum of disorders is heterogeneous and varies in severity of symptoms and age of onset, as well as in co-morbidity with language disorders, mental retardation, genetic disorders, and neurological symptoms such as epilepsy (Rapin, 1997). Variability in the expression of the core characteristics of autism extends across individuals, as well as within individuals, over time (National Research Council, 2001; Volkmar, Klin, & Cohen, 1997). For example, until recently it has been estimated that approximately 70% of children with ASD function in the mentally handicapped[1] range (Tidmarsh & Volkmar, 2003). However, the intellectual abilities of individuals with the disorder can range from the profoundly delayed to the gifted (Heflin & Simpson, 1998; Rapin, 1991). Despite this variability, autism remains a relatively robust diagnosis. A recent review of related research indicated that experienced clinicians reached an agreement rate of 82% on the diagnosis of autistic disorder, the disorder within the

---

[1] Several recent studies have suggested that the proportion of children functioning in the mentally handicapped range is decreasing concurrently with increasing prevalence estimates (National Research Council, 2001; Tidmarsh & Volkmar, 2003; Volkmar et al., 2004).

autism spectrum in which the full range of diagnostic characteristics is present (McGahan, 2001).

Genetics and ASD

As stated, autism is a heterogeneous disorder, one which appears to arise from diverse etiologies. Genetics almost certainly plays a key role. Evidence of a genetic basis for autism comes from many sources and includes the previously mentioned preponderance of affected males, higher concordance rates in identical than in nonidentical twins, increased risk for siblings of affected individuals, and an association with known genetic disorders such as Fragile X syndrome, tuberous sclerosis, and Rett syndrome (Fisher et al., 1999; Trottier, Srivastava, & Walker, 1999). Although associations between ASD and nongenetic disorders such as rubella, infantile spasms, herpes simplex, and encephalitis have been reported, heritability estimates of 90% indicate that autism is the most heritable of all of the psychiatric disorders (Nicholson & Szatmari, 2003). However, nongenetic factors also play a causal role. A recent population-based study found increased risk for autism associated with breech presentation, a gestational age at birth of less than 35 weeks, and a parental history of significant psychiatric disorders (Larson et al., 2005). Current evidence suggests that genetic predisposition, combined with various environmental factors, leads to abnormal brain development and the eventual manifestation of the behavioral, emotional, and cognitive characteristics of ASD (Courchesne, 2004; Holden, 2004).

Neurology and ASD

Whatever the combination of causal genetic and/or environmental factors, ASD is ultimately related to neurological functioning. Various neural abnormalities have been

implicated as the basis for ASD. Neurological findings that have recently appeared in the literature include differences in the density of cells within the cerebellum; structural differences in the vermin, brainstem, and corpus callosum; atypical neural cell migration; and defects in neurotransmitters and receptor structure (Fisher et al., 1999). Many of the initial studies of brain structure in autism suffered from numerous flaws, including small sample sizes, a lack of standardized diagnostic criteria and equivalent assessment procedures, the inclusion of heterogeneous subjects, and a failure to account for a number of critical confounding variables (Nicholson & Szatmari, 2003). Although much of this early evidence was inconsistent, and at times contradictory, replicated and reliable findings are showing up increasingly in the literature. For example, recent reviews of evidence from brain imaging studies have demonstrated consistently that individuals with autism have a smaller corpus callosum and increased brain volume, particularly during early childhood (Nicholson & Szatmari, 2003). Courchesne (2004) also found that the overgrowth in brain tissue is evident in areas that underlie higher order emotional, cognitive, social, and language functions.

Findings such as these are part of a rapidly growing body of evidence that reflects the substantial progress that has taken place in the last 10 years in understanding the neurological underpinnings of autism. Despite this growth of knowledge, the relationship between laboratory test abnormalities and anomalies in behavior continues to be tenuous. For example, in their recent review of imaging and postmortem studies, Nicholson and Szatmari (2003) found only one investigation that was able to demonstrate a link between clinical severity and anatomical structure. At this time it is not at all clear which findings are common in all individuals with autism and specific to autism. Consequently, although

there has been progress towards understanding autism neurological structure and function, it will likely continue to be a behaviorally defined syndrome.

Cognition and ASD

Differences in neurological structure and function are inevitably expressed through cognitive processes. The search for a cognitive theory that could provide a framework for understanding the co-occurrence of the behavioral patterns that define ASD has received increasing attention in the literature. Three major cognitive theories of ASD can be identified in this body of literature: a) "mind blindness," b) executive dysfunction, and c) central coherence. Although to some extent these theories are interrelated and overlapping, they are sufficiently distinct to warrant individual discussion.

The best known of these three has been alternatively referred to as theory of mind, mind blindness, and, in a recent iteration, the empathizing-systematizing (E-S) theory (Baron-Cohen, 2004). Mind blindness refers to the ability to identify, attribute, and manipulate mental states, with a particular deficit in the ability to empathize, relative to mental age (Baron-Cohen, 2004; Hill, 2004b). It has been suggested that the individual's development of an awareness of intentionality is fundamental to understanding the behaviors of others from a causal-explanatory framework (Twachtman-Cullen, 2000). Elements of an early understanding of intentionality are apparent in children as young as three years and appear to follow a developmental sequence of increasing complexity (Wellman & Lagattuta, 2000). This sequence appears to be disrupted very early in ASD. Starting with the failure to develop behaviors considered critical for social and communicative reciprocity, such as shared attention, children with ASD experience

increasingly apparent difficulty in identifying mental states in others and understanding intentionality. This disruption is seen as leading to the social and communicative difficulties that are the core characteristics of ASD. Some of the anecdotal evidence for a disability-specific deficit related to the development of intersubjective knowledge comes from the observation of difficulties with pragmatic components of language, joint attention, and pretend play (National Research Council, 2001). Empirical evidence supporting mind blindness as an explanatory construct has also come from a substantial body of neuropsychological studies (Baron-Cohen, 2004). Additionally, research involving neuro-imaging has identified abnormalities in the amygdala and other neurological structures known to be involved in the processing of social information (Hill, 2004b).

Whereas at the conceptual level the link between mind blindness and the social and communicative characteristics of ASD seems reasonably clear, the theory does not appear to provide a strong explanation for the nonsocial aspects of the disorder; in particular, the behavioral rigidity, repetitive behaviors, perseveration, and uneven pattern of cognitive skills seen in affected individuals. Partially in response to this gap, Ozonoff (1995) has proposed an alternative theory that involves a primary deficit in executive functioning, which refers to those cognitive abilities that allow the individual to disassociate themselves from the immediate environment in order to guide future actions (Hill, 2004a). Examples of executive functions include planning, set shifting, inhibition, self-monitoring, and the ability to generate novel ideas and behaviors. It is thought that executive function is crucial to behavioral self-regulation, the sequencing of behavioral actions, and adaptation to changing circumstances (Twachtman-Cullen, 2000). In short,

intact executive functioning underlies all aspects of what would be considered "adaptive behavior." Neuropsychological studies have found that individuals with ASD demonstrate particular difficulty with complex planning tasks, tend to respond in a "stuck-in-set" mode, and fail to inhibit prepotent responses (Hill, 2004a). For example, individuals with ASD have difficulty in performing sorting tasks that require a mid-task shift based on a set of implicit rules. Similarly, children with ASD will continue to point to a box holding a chocolate long after the rule for obtaining the chocolate has switched to pointing to an empty box. As is the case with the mind blindness theory, support for specific deficits in executive functioning can be found in neurological studies that have provided evidence of abnormalities in those parts of the brain that are known to be associated with these higher-order processing abilities; specifically, the medial temporal and frontal lobes (Hill, 2004a).

The third theoretical framework, the central coherence theory, arises from the observation that individuals with ASD, in contrast to those without ASD, show a preference for processing information at the local or detailed level over the global level (Baron-Cohen, 2004; Jarrold & Russell, 1997). A weakness in the normal tendency to integrate information has been used to explain the distinctive pattern of cognitive strengths and weaknesses observed in children with ASD. Many of the tasks at which individuals with ASD appear to be successful require analytic processing with attention to detail (Jarrold & Russell, 1997). For example, compared to mental-age-matched controls, individuals with ASD demonstrate superior performance on tasks such as identifying embedded figures and the block design subtest of the Wechsler scales of intelligence. Like the mind-blindness and executive-functioning theories of ASD,

evidence for the central coherence theory has been provided by laboratory-based neuropsychological studies. Unlike the other two theories, a link to specific structural or functional abnormalities of the brain and the central coherence theory have not been identified. Further, weak central coherence has been identified as a cognitive "style" rather than as a deficit (Jarrold & Russell, 1997).

Each of the cognitive theories briefly described here has considerable potential for fostering an understanding of the functional difficulties that individuals with ASD experience. However, it is extremely challenging to isolate discrete cognitive abilities in individuals without disabilities, let alone individuals with ASD. Laboratory tests designed to isolate and study particular aspects of cognitive functioning may be inadvertently impacted by other cognitive abilities. For example, it is difficult to conceive of a measure of social processing that did not involve the ability to shift attention across stimuli or was not "contaminated" by the communicative requirements of the task. Paradoxically, the more successful one becomes at examining "pure" cognitive processes, the less likely it is that the results will generalize to situations that require complex, coordinated responses. Consequently, there is a need to identify specific links between laboratory-based evidence of disability-specific cognitive deficits and the performance of complex tasks in natural settings. Despite these challenges, however, cognitive theories of ASD continue to evolve and provide insight not only into the fundamental nature of ASD, but also into critical aspects of normal development.

Prevalence

Although ASD was once considered an exceedingly rare disorder, the last two decades have seen a significant increase in the numbers of individuals who demonstrate a

sufficient number of characteristics to warrant a diagnosis of ASD. Whereas traditional estimates of prevalence ranged between 2 and 4 per 10,000 (Feinberg & Beyer, 1998), very recent prevalence studies involving large sample sizes, improved case finding and analytical methods in Canada and the United Kingdom have suggested that the number of individuals with ASD is closer to 60 per 10,000 (Fombonne, 2004). This number represents an approximate ratio of one individual with autistic disorder to two individuals with one of the other four disorders that fall within the spectrum. The ratio of affected males to females is approximately 4-5:1 (McGahan, 2001). Females diagnosed with ASD generally demonstrate a greater degree of mental retardation than do males, a fact that has significant implications for intervention studies (Boyd, 1998).

Even with improved methods, estimates of prevalence such as those cited above should be considered inexact at best. Such estimates are subject to variations in approaches to diagnosis and differences in screening methods (National Research Council, 2001). At a more fundamental level, it is also not known whether the reported increase in prevalence is related to variations in diagnosis, improved recognition, and/or an actual increase in the incidence of the condition within the general population (McGahan, 2001). Despite the uncertainties associated with prevalence estimates, there can be little doubt that children with ASD are appearing in the classroom in increasing numbers. An average annual increase of 27% in the number of children identified with ASD in public schools in the United States has been reported for 1993 to 2000 by the Special Education Child Count (Noland & Gabriels, 2004).

Long-Term Outcome

Ruble and Dalrymple (1996) defined a good outcome for a person with ASD as the "achievement of independence and a normal social life" (p. 3). The likelihood of a person with ASD achieving these outcomes, at least historically, is slim indeed. In a recent review McGahan (2001) reported on a study of long-term outcomes in autism that found that approximately 10%-15% of affected individuals live and work independently. The remainder of the individuals in the study achieved partial independence or required substantial support, and a significant proportion were admitted to psychiatric facilities. A comparison of outcome studies before and after 1980 found that a greater percentage of individuals in the studies carried out after 1980 tended to demonstrate better overall competency and higher language levels and were more likely to be employed and live independently (Tidmarsh & Volkmar, 2003). However, it should be noted that the number of employed and independent individuals with ASD included in the more recent studies continued to represent a very small percentage of the population.

Educational Intervention

Given the heterogeneity of the population, the enigmatic nature of the disorder, and the historically bleak long-term outcome, it is perhaps not surprising that the search for interventions and methods to improve the developmental trajectory of children with ASD is an overriding concern for parents and professionals. In fact, the field of autism has become well known for embracing interventions that are not well supported (Simpson, 2004). A review of the literature indicated that many of the intervention programs currently used with children with autism have limited if any theoretical or empirical basis, lack data supporting their efficacy, and have not been subjected to

reasonable evaluation efforts (Heflin & Simpson, 1998). It is beyond the scope of this review to describe in detail the interventions that have claimed to make a significant impact on the course of the disorder. As noted at the beginning of the review, however, the one treatment that has stood the test of time is structured educational programs designed around the individual's developmental level of functioning (Freeman, 1997). Nevertheless, although there has been general support for educational interventions in the professional literature, recent reviews have suggested that this support is based on a surprisingly complex and ambiguous body of evidence (National Research Council, 2001; Rogers, 2004).

Early Intervention Research

As noted previously, recent reviews of outcome studies of early intervention with children with ASD have reported evidence of accelerated growth in a number of important developmental areas. However, caution is warranted in attributing these gains to the exclusive effect of intensive educational intervention. The need for caution in interpreting these results arises from the flaws that are apparent in most, if not all, of the published intervention studies. For example, Smith (1999) noted that most investigations have lacked basic features of scientific studies such as experimental or quasi-experimental design, reliable assessments, and replicable descriptions of the treatment that the children received. This lack of scientific rigor is perhaps understandable given the complexity of conducting research with a relatively low-incidence, heterogeneous, and vulnerable population. For example, comparative studies of different treatment models would require features such as random assignment to different conditions, standard intervention protocols, outside assessments, high standards of treatment fidelity,

and longitudinal designs (McIlvane, 1996). It is clear that from a fiscal, ethical, and/or logistical perspective, conducting research that incorporates these elements is an enormous challenge.

One response to this challenge has been to look towards small-scale, well-designed studies that target individual aspects of early intervention for investigation. For example, Smith (1999) suggested that the analysis of specific and well-defined variables associated with intervention may be a viable alternative to large-scale definitive studies. Wolery (2000b) has also taken the position that large-scale studies comparing various intervention approaches cannot go forward without careful analysis of components of intervention, including the measurement of critical elements of the environment or setting in which the child is required to function. Consequently, it may be argued that the value and viability of large-scale comparative studies involving acceptable standards of research design may be dependent on insights gleaned from smaller and more focused investigations. In the short and intermediate term there appears to be a need for studies directed at specific aspects of educational intervention that can help to refine the questions and provide better tools for conducting more definitive research. Fundamental to this research agenda is the need to identify valid, reliable, and meaningful outcome measures.

Outcome Measures in Intervention Research

In a recent literature review Wolery and Garfinkle (2002) identified five categories of outcome measures associated with intervention programs for children with autism. These categories included measures of cognitive or intellectual status, developmental and achievement status/progress, postintervention placement,

reclassification of diagnosis, and autism symptom reduction. Lovaas's (1987) highly influential study provided a particularly pertinent example of the kinds of outcomes reported in the literature. In that study Lovaas reported postintervention IQ in the average range and placement in a regular-education class without additional supports for approximately 50% of a group of children following two to three years of intensive behavioral intervention. Subsequent studies using structured behavioral and/or developmental methods have indicated gains on developmental scales, nonverbal performance measures, symptom rating scales, standardized tests of language, and school placement. Table 1 lists some of the recent studies of early intervention and the outcome measures employed in these studies.

Although the results of these outcome studies are indeed promising, doubts have been expressed about whether these gains represent truly meaningful changes in functioning that can be directly attributed to the effect of early intensive intervention (Gresham & McMillan, 1997; Mundy & Crowson, 1997; National Research Council, 2001). To a considerable extent this skepticism can be traced to concerns about the validity of the measures used to substantiate the gains reported in the literature. These concerns can be categorized as general or global concerns that apply to most of the measures and specific concerns about the shortcomings of particular instruments or categories of instruments. The following critical analysis examines both the global and the specific concerns.

Table 1

Examples of Outcome Measures Included in Intervention Studies

Outcome measure	Study
Preschool Language Scale (PLS)	• Anderson et. al (1987) • Harris et al. (1991) • Boyd & Corley (2001)
Vineland Adaptive Behavior Scale	• Anderson et. al. (1987) • Birnbrauer & Leach (1993) • McEachin, Smith, & Lovaas (1993) • Short (1984) • Smith, Groen, & Wynne (2000)
Childhood Autism Rating Scale (CARS)	• Ozonoff & Cathcart (1998) • Rogers & Dilalla (1991) • Rogers, Lewis, & Reis (1989)
Bayley Scales of Infant Development	• Anderson et. al. (1987) • Birnbrauer & Leach (1993)
Merrill-Palmer Scale of Mental Tests	• Lord & Schopler (1989) • McEachin, Smith, & Lovaas (1993) • Smith, Groen, & Wynne (2000)
Leiter International Performance Scale (LIPS)	• Birnbrauer & Leach (1993) • Jocelyn, et. al (1998) • Lord & Schopler (1989) • McEachin, Smith, & Lovaas (1993) • Rogers, Lewis, & Reis (1989)
Stanford-Binet Intelligence Scale: Fourth Edition (SBFE)	• Birnbrauer & Leach (1993) • Harris et al. (1991) • McEachin, Smith, & Lovaas (1993) • Rogers, Lewis, & Reis (1989) • Smith, Groen, & Wynne (2000)
School Placement	• Fenske et al. (1983) • Lovaas (1987) • McEachin, Smith, & Lovaas (1993) • Scheinkopf & Siegel (1998) • Schwartz et al. (1998) • Boyd & Corley (2001)

Note. Adapted from Ludwig and Harstall (2001).

Critique of Outcome Measures

At the global level criticisms of outcome measures commonly reported in the literature have focused on three primary and related concerns: a lack of sensitivity to treatment effect, insufficient comprehensiveness, and (of particular importance to this project) uncertain ecological validity. With reference to a lack of sensitivity, the National Research Council (2001) noted that many of the measures used in recent studies were not designed as outcome measures. They provide a single metric that may not reflect changes or a lack of changes because of the effects of intervention (National Research Council, 2001). One example of a relatively stable trait that has been used as an outcome measure is IQ, which is one of the most commonly reported outcome measures in recent intervention studies (National Research Council, 2001). However, the tests used to measure this trait provide a very broad sample of cognitive skills and are specifically designed to reflect this stability (Foster & Cone, 1995; Sattler, 1988). As a result, a child's IQ score is unlikely to reflect changes brought about by intervention unless the intervention specifically targets that skill. Conversely, because there is rarely a direct relationship between the tasks that constitute IQ tests and particular intervention methods, it is extremely difficult to attribute reported changes in IQ to the effects of treatment, particularly when the assessment period is separated by many months or years (National Research Council, 2001).

A second and related criticism is that many of the commonly employed outcome measures lack sufficient breadth to gauge the full range of changes that may occur as a result of effective intervention (Schreibman, 2000). It has been argued that many measures of child-related outcomes such as IQ, language scores, classroom placement,

and developmental quotients reflect a restricted view of development because they provide only partial information about the total effects of intervention (Mundy & Crowson, 1997). This restricted view of development is inconsistent with contemporary perspectives of child development based on ecological systems theory (Bronfenbrenner, 1989; Dunst, 1993). Within the broader ecological view, child development is impacted by and, in turn, influences family and community support systems. Consequently, interventions that significantly impact child development will also influence these systems. For example, substantial improvements in child outcomes will likely affect family adaptation and the allocation of community resources necessary to support that child. The degree to which these systems adapt to and accommodate changes in child development will further influence child outcomes in a reciprocal fashion. Therefore, an accurate picture of broadly focused interventions is dependent on the use of multiple and varied measures directed at a broad sampling of developmental outcomes, the child's functioning within critical environments, and the responsiveness of those environments to the child's needs (Schreibman, 1999; Wolery, 2000b).

The concern with the impact of intervention on relatively narrowly defined measures of child development is directly related to the third general criticism, the lack of ecological validity. In essence, this criticism questions whether the results obtained on measures such as standardized tests of intelligence, adaptive behavior and language, or classroom placement necessarily translate into meaningful and equivalent changes in socially important behaviors within the settings those behaviors are most likely to be required. It has been acknowledged that generalization from structured and explicit settings to natural settings is the most entrenched challenge to intervention with children

with ASD (Volkmar, et al., 2004). Since standardized assessments are both structured and explicit, one cannot assume a direct relationship between gains on these tests and competence in naturalistic settings, particularly in those areas of functioning most directly impacted by ASD. For example, it has been noted that individuals with autism who appear to be functioning adequately, as demonstrated by scores on standardized assessments, still manifest autistic symptoms in significantly handicapping ways (Mundy & Crowson, 1997; Sheinkopf & Siegel, 1998). As a result a child who achieves scores in the average range on an IQ test may demonstrate such a high level of interfering behaviors that learning within a typical classroom environment continues to be severely compromised. In considering the importance of ecological validity, it is worth keeping in mind Schmuckler's (2001) observation that the relevance of the environment must be functionally central in producing and observing the behavior in question.

To a greater or lesser extent these three global shortcomings—a lack of sensitivity to treatment effect, a failure to measure the broader effects of intervention, and uncertain ecological validity—affect most of the measures employed in current studies. In addition, many of the measures that have been commonly employed in intervention studies also suffer from specific limitations related to particular characteristics of the measures and the appropriateness of the use of these measures with young children with ASD. To understand the full extent of these specific limitations, it is useful to look in detail at four commonly used types of outcome measures: cognitive or intellectual status, developmental assessments, adaptive behavior, and postintervention placement.

Measures of Cognitive or Intellectual Status

IQ has been identified as one of the best predictors of long-term outcome for children with ASD (Ruble & Dalrymple, 1996). For example, a number of recent studies have suggested that children with higher pre-intervention IQs demonstrate the strongest response to treatment (Gabriels, Hill, Pierce, Rogers, & Wehner, 2001; Harris & Handleman, 2000). The importance of IQ as a factor in the outcome of intervention is underlined by the fact that reporting the IQ of participants in intervention studies is a requirement for publication in most respected journals (National Research Council, 2001). However, although IQ may be important in describing a population and a significant moderator of responsiveness to treatment, it does not necessarily follow that IQ is an appropriate measure of treatment effect. The limitations of the use of IQ as an outcome measure become apparent when one considers the variability of the cognitive abilities across individuals with ASD and the lack of stability of IQ in young children who fall within the autism spectrum.

Intelligence tests are developed on the presumption of a certain degree of predictability and orderliness in cognitive development. Unfortunately, this presumption rarely applies to children with ASD. In general, individuals with ASD have significant difficulty with test items that involve verbally mediated skills and abstract reasoning, whereas they demonstrate relative strengths on concrete tasks that involve visiospatial, perceptual organizational skills and short-term memory (National Research Council, 2001; Prior, 1979). The uneven pattern of cognitive abilities is so pronounced that Kraijer (2000) described IQ in individuals with ASD as "a disharmonious aggregate of abilities" (p. 46). This variability challenges the assumption that test items based on typical

cognitive development provide a representative sampling of the abilities of children with ASD. For example, the vocabulary subtest included in the Stanford-Binet Intelligence Scale: Fourth Edition (SBFE) involves different tasks at different age levels. Initial items in the test require that the child simply label pictures, whereas at later stages the child is asked to provide verbal definitions to receive credit. These two tasks may appropriately represent the development of vocabulary skills in children with relatively even and predictable cognitive development. However, this change in the nature of the task may influence the responses of children known for atypical cognitive development very differently from those of the children for whom the test was designed.

In addition, current measures of intelligence lack a sufficient range of items to allow for measurement of both low- and high-functioning children with ASD at the start and end of an extended period of intervention (National Research Council, 2001). As a result, investigators often find it necessary to rely on scores obtained from different instruments for pre- and postintervention comparisons. For example, in Lovaas's (1987) landmark study he employed at least seven different measures of IQ with 38 subjects (Gresham & MacMillan, 1997). Because it has been noted that IQ scores of individuals with ASD can fluctuate 10 to 20 points within tests and even more across instruments, the validity of conclusions based on pre- and postintervention comparisons of IQ may be drawn into question (National Research Council, 2001).

Pre- and posttest comparisons of intellectual development are also affected by the lack of stability of the IQ scores of preschool children with ASD. In a longitudinal study Sigman et al. (1999) found that only 9% of a group of 70 children with ASD had IQ scores over 70 in the preschool years, whereas 33% had scores above 70 when they were

reassessed during adolescence. Citing a 1989 study by Lord and Schopler, the National Research Council (2001) reported a mean difference of 23 points in IQ scores taken at 3 and again at 8 years of age. These findings suggest that children first assessed during the preschool years may show significant change in IQ by the early school years even in the absence of early intervention.

Developmental Assessments

Developmental assessments such as the Psychoeducational Profile-Revised (PEP-R) and the Learning Accomplishments Profile (LAP) have been used to demonstrate the effectiveness of intervention in a number of studies (Luiselli, Cannon, Ellis, & Sisson, 2000; Ozonoff & Cathcart, 1998). Developmental assessments typically involve the measurement of global developmental domains such as cognition, communication, motor skills, and self-help skills and may involve the use of nonstandardized and/or standardized instruments.

The use of nonstandardized instruments as measures of treatment effect raises obvious questions related to validity and reliability. However, even developmental measures with reasonable psychometric properties have come under criticism, particularly from the perspective of ecological validity. It has been pointed out that the constructs that these developmental scales measure may be quite different from those that pertain to the successful adaptation to new environments (Barnett, Bell, & Carey, 1999; Barnett, MacMann, & Carey, 1992). For example, a child might be able to construct a simple pyramid of blocks from a model in a highly controlled assessment environment and thus pass the item on a test protocol or checklist. However, the same child may have little inclination toward constructive or interactive block play in the block center of the

playschool. Consequently, the test item bears little resemblance to important or functional activities.

Adaptive Behavior

The assessment of adaptive behavior has been extensively employed in intervention studies both to describe the participants and as an outcome measure. Adaptive behavior has traditionally been used along with standardized measures of intellectual ability to determine whether an individual with autism also warrants an additional diagnosis of mental retardation (Carter et al., 1998). As a component of development that contributes strongly to long-term outcome, adaptive behavior also represents a potentially significant indicator of the effects of intervention (Harris, Handleman, Belchic, & Glasberg, 1995; Paul et al., 2004). As a result, adaptive behavior is increasingly being viewed as the preferred measure of functional abilities with individuals with ASD (Kraijer, 2000).

Adaptive behavior measures such as the VABS offer a number of advantages that make them attractive as outcome measures in studies involving individuals with ASD. Adaptive behavior scales provide measures of actual behavior, require no cooperation from the child, tap some of the most important domains of development, are relatively sensitive to change, and, paradoxically (in the absence of intervention), may be more stable than IQ (Harris, et al., 1995; Kraijer, 2000). In addition, adaptive behavior scales also appear to measure some of the behaviors specifically impacted by autism. Individuals with mental retardation, but without autism, demonstrate relatively flat profiles across adaptive behavior domains (Carter et al., 1998). In contrast, individuals with autism have an uneven and relatively characteristic pattern of adaptive behavior.

This pattern involves lower overall adaptive behavior scores, significantly lower socialization scores, and greater interdomain scatter (Carter et al., 1998; Kraijer, 2000). Thus the pattern of adaptive behavior appears to discriminate between individuals with autism and those with mental retardation (Carpentieri & Morgan, 1996).

Although adaptive behavior scores have definite advantages over other types of measures in describing the functional abilities of individuals with ASD, caution is warranted when adaptive behavior is used as an outcome measure. Of particular concern is the complex relationship between age, intellectual ability, and the adaptive behavior of children with ASD. For example, in a large-scale study Jacobson and Ackerman (1990) found that the comparatively higher adaptive behavior scores of children with ASD who were 5-12 years of age compared to those of similarly aged children with mental retardation were reversed in older individuals (21-35 years) from both groups. Using a growth modeling technique, Freeman, Del'Homme, Guthrie, and Zhang (1999) discovered that growth curves for the communication and daily living skills domains of the VABS were related to IQ, whereas growth in the Socialization Skills domain appeared to be independent of intellectual ability. These results suggest that age and intellectual ability may interact to alter the course of development of adaptive behavior in individuals with ASD in subtle but important ways, and the findings could have important implications for intervention research if, as Freeman et al. suggested, there is a tendency for adaptive behavior to improve over time. As a result, outcome studies involving children with ASD need to account for the potential effects of both age and intellectual ability in reporting the impact of intervention on adaptive behavior.

However, the most important criticism of the current use of adaptive behavior as an outcome measure relates to the ecological validity of the reported results. Despite the fact that postintervention educational placement is often used as an outcome measure and thus constitutes a criterion environment, researchers who employ tests of adaptive behavior rarely report children's adaptive behavior skills within subsequent settings (Wolery & Garfinkle, 2002). This is particularly problematic considering that children with ASD are known to learn skills in a highly context-dependent way (National Research Council, 2001). As a result, one cannot assume that gains in adaptive behavior demonstrated by children with ASD generalize from one setting to another. Only by measuring adaptive behavior within the setting of interest is it possible to draw reasoned and cautious inferences about the effect of intervention.

Of the outcome measures considered up to this point, adaptive behavior offers a number of important advantages. However, the validity of adaptive behavior as an outcome measure is directly related to the extent to which it reflects the child's functioning in the postintervention setting. The importance of measuring the behavior of children with ASD in a context-specific way also has important implications for the last outcome measure included in this critical review, postintervention educational placement.

Postintervention Educational Placement

Increased scores on indicators of child development are relatively meaningless unless the scores reflect significant changes in relevant behaviors. Clearly, the primary purpose of intervention is not to increase gain scores, but rather to produce predictable and stable improvements in the ability to function across important settings in the lives of all children. As the following section illustrates, a number of researchers have attempted

to reflect this improvement by examining the impact of intervention on the child's postintervention educational placement.

Lovaas (1987) included school placement as a critical measure of the effectiveness of intensive intervention. For statistical purposes, he developed an educational placement (EDP) scale consisting of IQ, unsupported classroom placement, and promotion/retention (Gresham & McMillan, 1997). In that study 9 out of 19 of the best responders in the experimental group were placed in and passed Grade 1. In contrast, only 1 child out of 19 in the comparison group achieved this educational outcome. Perhaps as a result of the impact of Lovaas's study, other investigations of intervention with children with ASD have followed the tradition of reporting postintervention classroom placement. For example, educational placement was one of the most frequently reported outcome measures in two recent comprehensive literature reviews of intervention studies involving young children with ASD (Dawson & Osterling, 1997; National Research Council, 2001).

The importance of regular classroom placement is significant when one considers that it is generally acknowledged that students with severe disabilities require considerable curricular and instructional modifications and a higher level of supports than do students with mild handicaps and those without handicaps. For example, Logan and Malone (1998) found that students with severe disabilities required small-group, direct instruction; opportunities for one-to-one teaching; physical and gestural prompting; and high levels of teacher attention. Further, in a study involving 341 students with disabilities, Mancini, Coster, Trombly, and Heeren (2000) found that a set of social skills was the best predictor of successful participation in general classroom activities. These

social skills, which include showing general good manners, maintaining appropriate social and physical boundaries, and asking permission when required, are impacted by the core deficits associated with ASD and are exceedingly difficult for these children to acquire.

Currently, there is little reliable information about the additional instructional supports and classroom accommodations that children with ASD require. The few studies that have addressed this issue suggested that children with ASD are similar to children with other types of severe disabilities in their need for extensive supports, accommodations, and services. For example, a relatively recent study of students with autism with a mean age of 11 years found that only 16% were placed in a regular classroom without support and that approximately 70% of students with ASD required the full-time support of a teacher assistant (Eaves & Ho, 1997). Similarly, in a qualitative study of three children with ASD who were placed in regular education classes, Downing (1996) found that despite progress in social and academic areas, all three students required considerable support, were not performing at grade level, and demonstrated significant difficulties with socially interacting and controlling their inappropriate behavior.

Whether intensive intervention significantly improves the child's ability to function within classroom settings remains an open question. The ability to function at grade level without support that Lovaas (1987) reported for a significant proportion of the experimental group in his study has not been replicated in recent investigations using similar methods (Bibby, Eikeseth, Martin, Mudford, & Reeves, 2002; Boyd & Corley, 2001; Sheinkopf & Siegel, 1998). For example, Boyd and Corley found that only 4 out of

22 children involved in community-based, intensive intervention were placed in regular classrooms following treatment. Moreover, these children, also considered to be the best responders, received the support of a full-time instructional assistant.

Regular classroom placement is a highly desired outcome and certainly has social validity. However, the validity of postintervention placement as an outcome measure is undermined by the indirect relationship between classroom placement and the effects of intervention. For example, some researchers have suggested that class placement is linked to the children's age and ability level and that younger children and those with higher IQs are more likely to be placed in regular classes (Eaves & Ho, 1997; Harris & Handleman, 2000). Perhaps equally important is that placement decisions may be as strongly related to local school policy and the prevailing political and philosophical climate as they are to specific child characteristics (National Research Council, 2001). In her qualitative study, Downing (1996) concluded that the inclusion of students with ASD in regular classrooms had less to do with the characteristics of the child than with the staff's preexisting beliefs. Based on the evidence provided in these studies, factors such as age, IQ, and advocacy effects strongly influence placement decisions. In fact, the difficulty in attributing placement to any single factor has led to the mildly damning suggestion that postintervention placement is an imperfect, if not misleading, index of program efficacy (Wolery & Garfinkle, 2002).

The problems inherent in the use of classroom placement as an indicator of treatment effect are related to a more fundamental gap in knowledge; a lack of specific information about the level of participation, the required supports, and the functional skills demonstrated by children with ASD in school settings. As mentioned previously,

there is a paucity of information on the level of school adjustment of children with ASD. In the few studies that have addressed this issue, the researchers have not attempted to describe those supports and instructional requirements that appear to be specifically related to ASD rather than comorbid conditions such as mental retardation. Without such baseline information it is difficult to determine the impact of intervention on the child's adjustment to what is arguably one of the most important settings in which a child has to function, the classroom. Further, few of the measures employed in recent outcome studies were specifically designed to provide direct information about the child's ability to function within classroom settings. Consequently, there is a need to broaden the range of assessment models, instruments, and processes used to determine the effects of intervention.

New Directions in Assessment

In response to the limitations of traditional outcome measures, researchers have increasingly pointed out the need for varied and multiple measures to provide a fuller description of the impact of intervention. For example, Schreibman (2000) suggested that a battery of global and specific measures including developmental, ecological, and multisystem measures is required to provide a broad yet detailed picture of treatment effects. Others have argued for multi-informant assessment of both cognitive and social functioning (Scheinkopf & Siegel, 1998) and the use of quantitative and qualitative measures that build a comprehensive picture of the effects of intervention (Schuler, 2001). These views reflect some common themes including the growing agreement on the need for a broader conceptualization of outcomes, a reduction of the "context stripping" inherent in the use of standardized assessment instruments, and the selection of

measures that reflect an ecological perspective. In particular, it has been suggested that protocols are needed that create an understanding of the demands and expectations of different environmental activities and routines to produce precise measures of important outcomes (Wolery, 2000b). These outcomes include what the National Research Council (2001) succinctly described as the "acquisition of competence in natural contexts" (p. 228). To address this requirement of ecological validity, it is necessary to reconsider not only the instruments used as outcome measures, but also the underlying models of assessment.

The associated notions of competence and ecological validity imply an inseparable relationship between behavior and the demands and expectations of a specific setting. Writers who represent various disciplines have attempted to integrate these notions into frameworks for understanding human performance. Two of these frameworks, the ecological congruence model (Thurman, 1997) and the ecology of human performance (Dunn, Brown, & McGuigan, 1994) have particular relevance in identifying meaningful outcomes of intervention for children with ASD.

Ecological Perspectives on Human Performance

Thurman (1997) has developed a model for understanding human performance that is concerned with child development and the fit that exists between the characteristics of the child and the environment. The ecological congruence model involves three different dimensions: deviance, competency, and tolerance for difference. *Deviance* refers to the extent to which the child's behaviors or characteristics differ from those that would be expected within a specific environment, such as the classroom. Stated quite simply, children who conform to classroom and school expectations are more likely

to be perceived as more successful than children who do not conform (Mancini et al., 2000). *Competency* involves the child's skills and abilities that are required for a specific environment. Examples of competency skills in a classroom setting might include self-help skills and social/communication skills that are necessary for independent functioning, along with academic skills. Finally, *tolerance for difference* involves the adult's tolerance for the child's behavior and level of competence and the child's tolerance for the behavioral requirements and expectations of a particular environment. Within the ecological congruence model it is not the discrete behavior of the child that is of primary interest, but rather the degree of congruence or "adaptive fit" that occurs between the child and the environment along the dimensions of competency, deviancy, and tolerance for difference (Wolery, Brashers, & Neitzel, 2002).

Approaches to intervention, and hence the outcomes of intervention, are significantly different under the model of ecological congruence from those based on the normative or developmental model. Within the ecological congruence model, the desired outcome of intervention is the enhancement of adaptive fit (Thurman, 1997). Because adaptive fit can be influenced by teaching the child new skills, modifying the environment, changing expectations, and/or increasing acceptance of difference, the measure of intervention extends beyond the developmental competencies that the child demonstrates. Effective intervention may involve addressing any, or all, of the three dimensions of competency, reduction of deviance, and increasing tolerance.

Shifting from a focus on normative performance to adaptive fit has implications for the definition of outcomes and the design and selection of outcome measures. The next ecological perspective considered shares many of the ideas underlying the ecological

congruence model and has led to the development of an assessment process that may have particular relevance for individuals with ASD.

Consistent with the ecological perspective of Thurman (1997), the ecology of human performance framework (Dunn et al., 1994) suggests that human performance cannot be fully understood without reference to the context in which the behavior takes place. The essential postulate underlying this framework is that interaction between the person and the environment profoundly affects human behavior and performance. Within this framework the concept of environment is expanded beyond the physical setting to include temporal, social, and cultural elements. Individuals approach the environment with a range of experiences and skills and are presented with a variety of tasks necessary for the achievement of goals. The environment, in turn, provides cues and features to support or impede performance. Within this framework the interaction among the three elements of person, task, and context determine the achievement of goals.

According to Dunn et al. (1994), disability represents only one of a number of factors that can influence the performance of tasks. By definition, people with disabilities demonstrate some degree of limitation in their skills and abilities that may directly affect their competencies. In addition, disability may be exacerbated by a person's inability to use contextual features present in the environment that might be used to support performance. However, limitations associated with a disability can be ameliorated, or at least compensated for, when the environment is enriched to provide additional cues and supports. Conversely, a person without a disability will have limited performance if the environment fails to provide the necessary cues and supports. For example, an individual with strong analytical skills and weak social skills may be seen as strong performer who

works independently as a computer programmer. However, the same individual may be seen as "handicapped" if asked to perform the same task in a fluid and dynamic social environment.

In this example neither the individual nor the task has changed; however, the context has placed new demands on the individual without the necessary supports. Similarly, the person's performance might also be affected if the environment was held constant and the person's skills and abilities or the nature of the task was changed. Thus, outcomes are less dependent on the extent of ability or disability than on this complex relationship between person, task, and context in which the performance takes place. Assessment therefore needs to be directed at each of these elements. There has recently been an attempt to capture all of these elements in an assessment model.

Ecologically Based Assessment Models

In contrast to the linear and hierarchical approach associated with developmental models of assessment, Trombly (1993) has proposed an approach to the assessment of functional skills that is drawn from ecological perspectives such as the ecology of human performance framework. Occupation-centered assessment provides a top-down approach that emphasizes the primacy of the task in organizing an individual's goal-directed behavior. Within this model, human performance, although directly related to the skills, abilities, and limitations of the individual, is also subject to the challenges and supports associated with a particular social and physical context. The assessment of human performance must therefore expand beyond the physical and mental abilities of the individual to include the features and context of the task and the personal goals of the individual.

Coster (1998) has adapted Trombly's (1993) assessment model to examine the functional abilities of children with disabilities relative to school settings. Within Coster's adaptation, assessment is directed at three levels. The first level of assessment is concerned with the overall pattern of social participation in relation to a particular context of importance. At this level the assessment process focuses on the degree to which the child can access and participate in opportunities and roles that are open to others of the same age and culture. The target of assessment is to determine the level of participation in activities that facilitate or enhance development and are perceived to be personally satisfying and acceptable to caregivers. For example, at this level of assessment it is more important to measure the extent to which a child becomes meaningfully engaged in a physical education lesson in a way that does not conflict with the teacher's expectations than it is to focus on the child's individual motor skills. The essential question associated with Coster's first level of assessment is, "To what extent is the child included in or restricted from participating in the activities and opportunities that are made available to similar children of the same age and culture?" (Coster et al., 1998, p. 6).

The next level of assessment within Coster's (1998) model is concerned with identifying the critical tasks that comprise the child's role in relation to the school. *Tasks* are defined as a set of related activities that share a common focus or goal (Coster et al., 1998). At this level the focus of assessment is on the extent to which the child is currently meeting expectations for performing important tasks expected of similar-aged peers within the school environment. This level of assessment is also concerned with identifying the impediments to carrying out those tasks.

At the final level of the assessment process, information is gathered about the aspects of task performance that are most limiting to the child's participation. This level extends the assessment to the specific activities that may be negatively impacting the child's participation and hence his or her role performance as a student. This level of assessment is analogous to the discrete functional skills included in most adaptive behavior tests. Coster (1997) pointed out that it is necessary to identify the key activity limitations to determine the nature of the intervention that is likely to be the most effective. The measure of successful outcome, however, is not a change in specific abilities or component skills, but rather enhanced engagement and participation.

The School Function Assessment

Coster (1998) has operationalized her adaptation of Trombly's (1993) formulation of occupation-centered assessment in the School Function Assessment (SFA). The SFA has been described as a "criterion-referenced assessment that measures a student's current level of performance related to a continuum of educationally relevant functional skills" (Hwang et al., 2002, p. 49). The SFA examines the student's level of participation in six major school activity settings, the supports and adaptations that the student needs to participate effectively in the school program, and the student's performance of specific school-related functional skills (Coster et al., 1998).

Occupation-based assessment, as it is operationalized in the SFA, draws on ecologically based models of assessment and intervention. In particular, the SFA appears to be consistent with both Thurman's (1997) ecological congruence model and Dunn et al.'s (1994) ecology of human performance framework, which emphasize both the development of the child and the adaptive fit between the characteristics of the child and

the environment. Table 2 contrasts the differences between norm-referenced assessments and occupation-centered assessment.

Table 2

Comparison of Norm-Referenced Assessment Model to Occupation-Centered Assessment

Norm referenced (e.g., Wechsler Intelligence Scales, VABS)	Occupation-centered (e.g., School Function Assessment)
Developmental model	Ecological congruence model
Primacy of ability	Primacy of task
Performance relative to typical development	Performance relative to a criterion
Items are scored as pass/fail	Scoring system acknowledges partial participation and necessary supports
Items may not be relevant to classroom adaptation	Items derived from classroom environment

Conceptually, the SFA appears to provide a measure of the adaptive fit between the child and a specific classroom environment. Therefore the SFA may be a useful addition to the instruments that can be used to determine the effectiveness of educational interventions. However, face validity, although desirable, is insufficient to establish the worth of the SFA compared to conventional norm-referenced assessments. After all, traditional measures of outcome have the advantage of being well known and extensively studied and, in the case of instruments such as the Vineland Adaptive Behavior Scale and most individually administered IQ tests, possess enviable psychometric properties (Sattler, 1988). It is necessary to establish the validity, reliability, and utility of the SFA as a new instrument. A limited body of research has provided evidence of the

psychometric soundness and utility of the SFA with children with heterogeneous disabilities, as discussed in the following section.

Validity and Utility of the SFA

Coster, Mancini, and Ludlow (1999) examined the factor structure of the SFA in an investigation of the ability of 507 students with various disabilities to meet the functional demands of the elementary classroom. Their results indicate that the construct of school function involves two major dimensions: cognitive behavioral function and physical function. Cognitive behavioral function involves tasks such as positive interaction, functional communication, compliance with directives, behavior regulation, safety, memory and understanding, and task completion. Physical function includes such tasks as clothing management, hygiene, travel, recreational movement, maintaining and changing position, eating and drinking, and set-up and clean-up tasks. Significantly, from the perspective of students with ASD, Coster et al. found that the cognitive-behavioral dimension accounted for much of the variance in the performance of school-related functional tasks.

Silverman, Stratman, and Smith (2000) investigated the proposition that environmental supports make a unique contribution to task performance, one of the fundamental components of the construct of school function. The SFA identifies two types of task supports, assistance and adaptations. *Assistance* refers to adult help that the student requires to complete tasks. *Adaptations* include modifications of the task or activity, adaptations to the environment, and the use of adaptive equipment (Silverman et al., 2000). In this study partial correlations between activity performance and adaptations (two of the scales included in the SFA) ranged from .12 to .46 for physical

tasks and between .14 and .41 for cognitive/behavioral tasks. Silverman et al. contended that their results confirm the proposition that environmental supports in the form of adaptations are associated with task performance. Unfortunately, a lack of information about the participants or the methods employed limits the usefulness of this study.

Hwang et al. (2002) investigated the construct validity of the SFA. They administered the SFA and the classroom version of the Vineland Adaptive Behavior Scale to 64 students, including students with cerebral palsy, students with learning disabilities, and students without disabilities. Support for the concurrent validity of the SFA was shown in the moderately high correlations of .56 and .72 between comparable sections of the SFA and the classroom edition of the Vineland Adaptive Behavior Scale for the two groups of students with disabilities. Discriminative validity was established using the known groups method, in which groups with known characteristics can be distinguished by significant differences in test results (Hwang et al., 2002). The SFA correctly classified 88.2% of the students with cerebral palsy, 93.1% of the students without disabilities, and 55.6 % of the students with learning disabilities. Children with learning disabilities were the most likely to be incorrectly classified, which suggests that the SFA more accurately classifies children with motor and significant cognitive/ behavioral impairments.

Mancini et al. (2000) used the data that they collected from a subgroup of 341 children with disabilities during the standardization of the SFA to predict their level of participation in school activities. A series of statistical analyses was conducted to construct a dichotomous variable described as either full or limited participation. This dichotomous classification differentiated children who can participate in school activities

only with constant supervision or help, from those who require limited or occasional assistance. Using data from the SFA, these researchers were able to predict with 85% accuracy which children were full participants and which students demonstrated limited participation in school activities. Not surprisingly, the children who lacked whole-body and postural control were more likely to demonstrate limited performance in classroom activities. More important, these researchers also found that children who demonstrated a specific set of social skills that included general good manners, maintaining appropriate social and physical boundaries, and asking permission were more likely to be considered full participants. Further, the results of this study indicate that the information gathered from the SFA was a better predictor of participation in school-related activities than was the information about the type and severity of the child's disorder. In other words, the information gathered on the child's functional abilities was a better predictor of classroom participation than was the child's diagnosis or qualitative statement of the severity of the disorder.

Although far from being conclusive, the preceding investigations suggest that the SFA may add to our understanding of outcomes for children with disabilities. Based on this limited, but promising, body of evidence, it seems reasonable to apply the SFA to the study of children with ASD. The structure of the SFA, the construct upon which this instrument is based, the lack of information on the school adjustment, and the need for measures of adaptive fit within school settings of children with ASD are all compelling reasons to investigate with regard to the usefulness of the SFA with this population. Unfortunately, children with ASD constituted a very small proportion of the children included in the standardization sample (7.7%). This lack of representation in the

standardization sample is problematic when one considers that many of the assumptions underlying most of the commonly used outcome measures do not necessarily apply to children with ASD. Accordingly, to realize the promise of an instrument such as the SFA, it is necessary to establish its validity and utility specifically with students with ASD.

Summary of the Literature

The diagnosis of autism has traditionally been associated with long-term outcomes that can be accurately described as bleak. Fortunately, as the preceding literature review suggests, educational intervention in general and early intervention in particular appear to have a significant influence on the developmental outcomes of children with autism. However, support for educational interventions for children with ASD is built on a surprisingly small and complex body of evidence. It is therefore important that research directed at identifying the impact of such intervention on specific, relevant, and clearly identified areas of functioning continue. Practical constraints associated with large-scale comparative studies suggest that to move the state of the science forward, it is necessary to realize incremental increases in knowledge. As a result there is a need for carefully designed studies directed towards answering specific questions related to the effectiveness of educational interventions.

One component that is fundamentally important in this complex task of determining the effectiveness of educational interventions with children with ASD is the identification of appropriate outcome measures. As this review suggests, norm-referenced measures commonly used in outcome studies provide at best partial and indirect evidence of the impact of educational interventions on the child's ability to function in important environments. In general these measures do not necessarily reflect the acquisition of

competence in natural contexts that has been identified as a truly meaningful outcome of education for this group of children (National Research Council, 2001; Schuler, 2001).

The criticisms that have been leveled at other norm-referenced measures are particularly applicable to the use of postintervention classroom placement as an outcome measure. Superficially, classroom placement appears to be a reasonable indicator of child competence and the success of intervention efforts. However, the type of classroom to which a child is assigned tells us little about that child's ability to function within that setting, let alone the effectiveness of any prior intervention efforts. Classroom placement is simply too gross a measure and too confounded by extraneous factors to serve as a valid indicator of treatment effect. However, in contrast to classroom placement, critical aspects of school-related functional competencies and the level of required supports appear to constitute meaningful outcomes of educationally based interventions. Unfortunately, there has been little attempt to describe these competencies or the types of assistance and adaptations that this population requires in classroom settings. Further, norm-referenced measures that focus exclusively on child development are unsuited to this purpose. Accordingly, there is a need to expand the battery of outcome measures that are currently available to include instruments that can accurately reflect the child's functioning within the critically important postintervention environment of the school.

One instrument that holds promise for providing a measure of the acquisition of competence referenced to a specific environment is the SFA (Coster et al., 1998). In contrast to instruments that are based on assessment models that focus on discrete and isolated skills, the SFA purports to provide information on the level of the child's participation in classroom activities, school-related functional skills, and the level of

supports that a child with disabilities requires. Hence the SFA may be useful in assisting educators in determining both the target and the impact of interventions, thus extending and enhancing the assessment process. However, although, conceptually, the SFA is consistent with models of human performance that focus on competence within specific environments, neither the usefulness nor the validity of this instrument with this population can be assumed. As Anastasi and Urbina (1997) pointed out, the validity of a measure cannot be considered in the abstract; it must be established with reference to the particular use for which the test is being considered. Thus, the value of the SFA as a measure of the effectiveness of educational interventions for children with ASD needs to be determined.

CHAPTER 3:

RATIONALE AND RESEARCH QUESTIONS

Introduction

As highlighted in the preceding chapter, the identification of meaningful and valid outcomes of educational interventions directed at children with ASD is a critically important component of a larger research agenda. Outcome measures currently employed in intervention studies provide only partial information and cannot therefore fully address important academic, applied, and public-policy concerns associated with costly and intensive forms of intervention. As a result, it is necessary to look towards a broader conceptualization of outcomes that includes salient aspects of child functioning in postintervention settings. This kind of information is essential to determine the real gains of children with ASD. The SFA purports to provide such information relative to a particularly important environment in the lives of all children, the classroom. However, although the SFA provides specific information on the level of participation, required supports, and functional skills demonstrated by children with disabilities in classroom settings and holds some promise as a needed measure, it is a relatively new instrument. Furthermore, because neither the validity nor the utility of the SFA has been established with children with ASD, it would be useful to establish them for this population.

The current investigation had a number of objectives. The primary purpose of this study was to investigate the validity and usefulness of the SFA as a measure of the effectiveness of educational interventions for children with ASD. Second, I have used the SFA data to describe the school functioning of a group of students with ASD in terms of

the degree of participation in school activities, the required level of supports, including adaptations and adult assistance; and the performance of school-related functional skills. Finally, in this study I have attempted to tease out the impact of ASD on school functioning by comparing the similarities and differences in school functioning of the target group and a group of students with comparable intellectual functioning, but without ASD. The research questions related to each of these purposes are described in the following sections.

Validity of the School Function Assessment

Although as a measure of school functioning the SFA has face validity, to date no studies have been conducted with this instrument specifically with students with ASD. The current study is intended to address that gap in the research by exploring the validity and utility of this instrument with children with ASD and cognitive delays who attend congregated special education classes. The following research questions pertain to the validity of the SFA and teachers' perceptions of the usefulness of the instrument with this population.

Convergent Validity of the SFA

1. What is the relationship between composite scores of the SFA and the Vineland Adaptive Behavior Scale–Classroom Edition (VABS-C) for children with ASD?
2. What is the relationship between comparable sections of the SFA and the VABS-C for children with ASD?

Discriminant and Discriminative Validity of the SFA

3. What is the relationship between composite scores of the SFA and the Maladaptive Behavior Domain score for children with ASD?
4. Do the subscale scores of the SFA discriminate between children with ASD and children with cognitive delays without ASD?

Teachers' Perception of the Appropriateness of the SFA

5. How do teachers rate the appropriateness of each of the sections of the SFA administered to a group of students with ASD?
6. Is there a relationship between the age of the child or the adaptive behavior composite score of the child and teachers' perception of the usefulness of the SFA?

School Functioning of Students With ASD

Any attempt to identify the impact of ASD on school functioning has to account for the effect of cognitive functioning. It is known that certain cognitive capacities are fundamental to adaptive behavior and that adaptive behavior scores are moderately correlated with IQ (Reschly, 1990). There is also some evidence that adaptive behavior and school functioning are at least moderately correlated (Hwang et al., 2002). Accordingly, it seems reasonable to conclude that there is a relationship between school functioning and cognitive ability. Simply stated, children with generalized delays are likely to demonstrate lower levels of school-related functional skills and require higher levels of support regardless of diagnosis. Because ASD is frequently associated with significant cognitive delays, the relationship between ASD and school functioning cannot be determined without considering the impact of these delays.

To determine the unique impact of ASD on school functioning, the current study included a comparison group of children with comparable intellectual abilities but without autism. The following research question guided the comparisons of the school functioning and adaptive behavior of children with ASD with children with cognitive delays but without ASD:

7. Are there differences in the level of adaptive behavior and school-related functional skills, participation in school activities, and required adaptations and supports for children with ASD and cognitive delays and children with cognitive delays only?

CHAPTER 4:

METHODS

Chapter 4 outlines the methods that I employed in conducting this study. The chapter is organized into sections beginning with the criteria for participation and followed by descriptions of the recruitment process, assessment procedures, research design, and instrumentation. I designed these methods to answer the research questions and to accommodate, as fully as possible, the limitations imposed by the conditions associated with this study and those associated with conducting research involving children with ASD in natural settings in general.

Participants

The criteria for participation that I used for children with ASD and cognitive delays and children with cognitive delays without ASD are outlined in Table 3. These criteria were selected to insure that the children with ASD and the comparison group were maximally similar, except for diagnosis. The criteria were modified somewhat as the study progressed. For example, none of the children with ASD had motor impairments that limited their mobility, whereas a number of the children referred for the comparison group had disabilities involving severe motor impairments. The presence of children with limited motor control in one of the groups would introduce an extraneous variable that could impact the validity of the comparisons; consequently, nonambulatory children and children with a primary disability in the area of physical functioning were not included.

Table 3

Description of Criteria for Participation

	ASD group	Comparison group
Age	5½ - 13 years	5½ - 13 years
Diagnosis	Meets criteria for autistic disorder or pervasive developmental disorder: not otherwise specified (PDD:NOS or atypical autism) as described in the *DSM-IV*	Diagnosis of mild-moderate mental retardation, mild-moderate developmental disability, or mild-moderate cognitive delay
	Diagnosis established by a child psychiatrist, developmental pediatrician, or chartered psychologist	Diagnosis established by a child psychiatrist, developmental pediatrician, or chartered psychologist
Placement	Attending disability specific class for students with ASD and/or cognitive disabilities	Attending disability specific class for students with cognitive disabilities
Level of functioning	Functioning 1.67[a] or more standard deviations below the mean on a standardized test of intelligence and/or adaptive behavior scale	Functioning 1.67 or more standard deviations below the mean on a standardized test of intelligence and adaptive behavior scale

[a] Criterion for eligibility for cognitive delays in Alberta is defined as an IQ of 75 or less.

Also, as described in the Research Design section of this chapter, some preselection of classes was necessary to ensure that the groups were comparable in terms of age and functional level. As a result of the use of a quasi-matching procedure that involved intact groups, the children who participated in this study should be considered a sample of convenience. The rationale for the selection criteria and the recruitment procedures are described more fully in the following section.

Recruitment

The children who participated in this study were recruited from congregated special education classes for children with disabilities located in four school jurisdictions in northern Alberta. These congregated classes included disability specific classes (for children with ASD) and classes for children with cognitive delays associated with a variety of disabilities. The children with ASD were recruited from both types of classes, whereas the children without ASD were recruited exclusively from the latter. Wherever possible, children from both groups were recruited from the same class.

Recruiting children from congregated special education classes for this study provided logistical advantages and increased the validity of comparisons drawn across diagnostic groups. From a logistics perspective, recruiting children from congregated settings increased the access to the children and their teachers by reducing the challenges associated with travel and communication with many teachers from classes that serve individual children. Compared to teachers working in inclusive settings, those working in congregated classes are more likely to be familiar with formal and informal assessment processes and terms used in assessment protocols. Additionally, I assumed that children placed in these classes would have extensive psychological and diagnostic assessments on file and believed that the information available from these assessments could be used to establish distinct diagnostic groups and ensure the comparability of the groups in areas outside of ASD. Finally, factors such as class size, curricular focus, specialized knowledge and skills of the staff, and instructional supports are likely to be more similar across classes that serve children with developmental disabilities than across those that serve children who are involved in inclusive programs.

Once I established the criteria for participation in the study and received the necessary approval from the University of Alberta Ethics Review Committee, I approached a number of regional and district research review committees for permission to conduct the study. Of the eight school jurisdictions located throughout the province that I contacted, I included four in the study, two jurisdictions indicated in writing that they would not participate, and two indicated some interest in the study; however, I did not include them because of logistical considerations related to travel. The four included an urban school jurisdiction located in a metropolitan area, a small urban jurisdiction, and two jurisdictions that serve both rural and suburban populations. With the exception of the smaller urban school jurisdiction, all of the schools were located within a 40-kilometer radius of the University of Alberta. The smaller urban jurisdiction is located approximately 500 kilometers from the university campus.

I completed a pilot study that involved four children with ASD in the first school jurisdiction that granted permission. It was carried out in the spring of 2004 to determine the feasibility of a larger-scale investigation and to anticipate potential problems and facilitate planning. The pilot study revealed that the completion of the two major questionnaires (SFA and VABS-C) required 2.5 to 3.5 hours of teacher time for each participant. The jurisdiction where the pilot was completed, along with several others, agreed to participate contingent on payment for the teacher time required for the completion of the assessment package. Consequently, supply-teacher time equivalent to one day for every three children included in the study was offered to all teachers who completed assessments.

The specific schools in each district were selected from lists provided by central administrative personnel of congregated programs for children with significant disabilities. Consistent with district protocols, I contacted the school principals and provided a general overview of the study. I approached a total of eight schools within these four districts. Within the large urban school district I contacted a total of five schools, one with congregated classes for children with ASD, three with classes for children with cognitive delays, and one with both types of classes. Two of the schools, one in a suburban jurisdiction and the other in the outlying urban area, were "magnet" schools for children with significant disabilities and had several heterogeneous special education classes. These schools also had onsite multidisciplinary teams that included teachers, occupational and physical therapists, and speech and language pathologists. The final school was the only elementary school within that suburban jurisdiction with an elementary program for children with cognitive delays that included children with ASD.

I encouraged the principals in these schools to discuss the study with their teachers and to emphasize that participation was voluntary and could be withdrawn at any time. One or more teachers in seven of the eight schools expressed interest in the study, and I met with them to provide additional information about the study and examples of the test protocols and to answer questions prior to obtaining their consent to participate. The principal of the school who decided not to participate in the study cited teacher concerns with demands on his or her time as the primary reason for declining.

Once I solicited interest for the study from principals and teachers, I sent a letter of intent (Appendix A) to the schools for distribution to the parents of all of the children who attended the targeted classrooms and met the criteria. This included a brief

description of the study and information on how to contact me should the parent wish further clarification. Parents who were interested in receiving more detailed information were asked to sign the letter of intent and return it to the child's teacher. Upon receipt of the signed letter of intent, I sent a detailed description of the study and a consent form to the interested parents. This follow-up letter (Appendix B) described the rationale for the project, time commitments, the nature of the assessment activities, and measures that would be taken to protect anonymity and confidentiality. A number of parents requested additional information, and I subsequently contacted them. A total of 52 signed consent forms were returned, with 51 granting consent. Of the 51 children for whom consent was received, 39 were included in the study. The remaining children were not included because they exceeded the age range of the assessment instruments or had primary motor disabilities. I also received written consent for participation from the teachers (Appendix C).

Assessment Procedures

Once I received the signed consent forms, I completed a review of the child's school record. I gathered information on the child's diagnosis, the diagnostic procedures employed, and the results of standardized assessments. At the same time, I gave the assessment packages to the teachers who had consented to participate, reviewed the written instructions that accompanied the questionnaires (Appendix D), and responded to any questions. In the case of the school jurisdiction located furthest from the U. of A. campus, the Director of Special Education in that jurisdiction coordinated the assessment activities and communicated regularly with me.

The package of assessments that I gave the teachers consisted of the Classroom Edition of the VABS-C, the SFA, the Maladaptive Behavior Domain of the VABS: Interview Edition, and a 7-item scale that rates the appropriateness of each of the subscales of the SFA. I provided all of the assessment instruments at the same time.

Upon completion of the assessments, I conducted brief interviews with the participating teachers to gather information on the type and level of supports provided to the child. I also asked the teachers to describe the level of adult assistance and professional support services that the child received in the areas of speech and language pathology, occupational and physical therapy and behavioral consultation. In addition, I asked them about their teaching experience and professional preparation and to respond to the following four questions:

1. How much time was required to complete the two primary instruments (SFA and VABS)?
2. Was the SFA useful?
3. Which components of the SFA were relevant to the needs of your students?
4. Which instrument (SFA or VABS) provided more relevant information?

Research Design

This study involved three related components of research: correlational, comparative, and evaluative. The correlational component of the study focused on the exploration of the relationships between measures within a group of children with ASD; the second component compared the performance of two groups of children across a variety of measures, which thus involved incorporating elements of a causal comparative design; and the final component examined the teacher's perceptions of the

appropriateness of the SFA. Because the study required neither the manipulation of variables nor the random assignment of participants, it is best described as descriptive and correlational research. A brief description of the methods used in each of the components of this study is provided below.

Correlational Component

As noted previously, the first objective of the study was to investigate the validity of the SFA for children with ASD. When a new measure such as the SFA is developed, it is important to determine the pattern of correlations between the new measure and other, established measures of related constructs, as well as between measures of unrelated constructs (Kazdin, 1998). Establishing this pattern of convergent and discriminant relationships between measures helps to confirm that the instrument under investigation actually measures what it purports to measure (Foster & Cone, 1995).

Convergent validity. Drawing on an earlier study by Hwang et al. (2002), I used the Vineland Adaptive Behavior Scale–Classroom Edition (VABS-C) as the criterion measure in this investigation to establish the convergent validity of the SFA. Using the guidelines that Hwang et al. described, I grouped subtests of the SFA to construct sections that were conceptually similar to the domains of the VABS-C (Table 4). As described in the literature review, the VABS-C has been extensively employed in outcome and comparative studies involving children with ASD (National Research Council, 2001). It is also recognized as a psychometrically sound instrument with well-developed standardization procedures and theoretical base (Hwang et al., 2002). Like the SFA, the VABS-C focuses on school-related functional skills. As a result, significant positive correlations between comparable sections of the two instruments would be

Table 4

Comparable Domains on the School Function Assessment (SFA) and the Vineland Adaptive Behavior Scales (VABS)

SFA scales	SFA domains	VABS domains
Participation	Composite	Composite
• Participation		
Task Supports		
• Physical tasks assistance		
• Physical task adaptations		
• Cognitive/behavioral task adaptations		
• Cognitive/behavioral task assistance		
Physical task performance	Daily Living Skills	Daily Living Skills
• Travel		
• Maintaining and changing positions		
• Recreational movement		
• Manipulation with movement		
• Using material		
• Setup and cleanup		
• Eating and drinking		
• Hygiene		
• Clothing management		
Cognitive and/behavioral task performance		
• Personal care awareness		
• Safety		
Cognitive and/behavioral task performance	Communication	Communication
• Functional communication		
• Memory and understanding		
Cognitive and/behavioral task performance	Socialization	Socialization
• Follow social conventions		
• Compliance with directives and rules		
• Task behavior/completion		
• Positive interaction		
• Behavior regulation		

(Adapted from Hwang et al., 2002)

considered to be evidence of the convergent validity of the SFA. However, as noted, the SFA has a different theoretical base and scoring system and, unlike the VABS-C, also includes measures of assistance, adaptations, and level of participation. The two instruments could therefore be expected to be significantly, but less than perfectly, correlated.

Discriminant validity. Evidence of discriminant validity is provided by low correlations between measures of traits that are thought to be unrelated (Foster & Cone, 1995; Kazdin, 1998). In the current study, I examined the discriminant validity in two ways: (a) I examined the discriminant validity of the SFA by applying the criteria that Campbell and Fiske (1959) originally suggested to the pattern of relationships between the domains of the VABS-C and comparable sections of the SFA; (b) I used the Maladaptive Domain of the Interview Edition of the VABS to establish the discriminant validity of the SFA through an examination of the relationship between maladaptive behavior and subscales that measure physical supports and task performance, and cognitive behavioral supports and task performance. I will briefly explain each of these methods.

According to Campbell and Fiske (1959), there are three criteria of discriminant validity: (a) The relationship between different measures of the same trait (heteromethod-monotrait) should be stronger than different measures of different traits (heteromethod-heterotrait), (b) the relationship between different measures of the same trait (heteromethod-monotrait) should be stronger than the relationship between different traits using the same method of measurement (monomethod-heterotrait), and (c) the pattern of relationships between similar methods of measurement of different traits should hold for

different measures of different traits. Similar applications of these criteria have been used in related studies. For example, Middleton, Keene, and Brown (1990) employed them to explore the relationship between the VABS and the Scales of Independent Behavior (SIB).

In this study I applied Campbell and Fiske's (1959) criteria to the pattern of relationships between the domains of the VABS-C and comparable sections of the SFA, as outlined by Hwang et al. (2002) and described in Table 4. In the current study the first criterion would be met if, for example, the relationship between the communication domain of the VABS-C and SFA-Communication (heteromethod-monotrait) was stronger than the relationship between the communication domain of the VABS-C and SFA daily living (heteromethod-heterotrait). An example of the second criterion might involve a pattern of higher correlations between SFA-socialization and the socialization domain of the VABS-C (heteromethod-monotrait) compared to the correlations between the SFA-Socialization and SFA-Daily Living Skills (monomethod-heterotrait). Finally, the third criterion would be met if the strength of the relationship between the socialization and communication domains of the VABS-C were stronger than the relationship between the socialization and daily living skills domains of the VABS-C and the same pattern was found for the equivalent subscales of the SFA.

The second approach to investigating the discriminant validity of the SFA involved the use of the Maladaptive Domain of the Interview Edition of the VABS. Conceptually, maladaptive behavior and adaptive behavior represent opposite ends of a continuum. Accordingly, the presence of maladaptive behavior could be assumed to be incompatible with adaptive school functioning. It would be reasonable, therefore, to

expect that a high level of participation and school-related functional skills would be negatively correlated with maladaptive behavior and would result in significant negative correlations between the SFA and the Maladaptive Scale. However, the SFA consists of scales that measure physical tasks support and activity performance and cognitive/behavioral task support and activity performance. A stronger relationship could be expected between measures of maladaptive behavior and measures of cognitive/behavioral functioning than between measures of tasks that are primarily physical in nature. Accordingly, evidence of discriminant validity would be provided by strong correlations between cognitive/behavioral scales and relatively low correlations with physical task supports and activity performance.

In addition to convergent and discriminant validity, the original research plan called for an examination of a third form of validity, discriminative validity. Discriminative validity involves contrasting groups known or presumed to differ on a construct or measure (Foster & Cone, 1995). This validity is established when group membership can be predicted at levels that significantly exceed chance predictions from a set of psychological test scores. In addition to providing evidence of the validity of a new measure, distinguishing between groups is also an indication of the usefulness of the measure. Hwang et al. (2002) employed this strategy in their study, which they referred to as the *known group* method, to classify children into three diagnostic groups (e.g., cerebral palsy, learning disabilities, and nonhandicapped children) based on scores obtained from the SFA. In the original research plan, this strategy was to be employed to determine whether the SFA could be used to classify the participants into cognitively delayed children with a diagnosis of ASD and those without a diagnosis of ASD. Based

on the results of studies described in the literature review that involved the VABS, it could reasonably be predicted that contrasts would most likely be found on measures of cognitive/behavioral skills and least likely to be found on measures of self-help skills. However, establishing the discriminative validity of an instrument requires the use of multivariate analysis techniques such as discriminative function analysis. This type of analysis requires that the data be consistent with certain assumptions. As detailed in the Results chapter, these assumptions could not be met with the data obtained; consequently, the discriminative function analysis could not be completed.

Comparative Component of the Study

I compared the school functioning of children with ASD to that of a group of children without ASD by using a quasi-experimental design that has been described as causal-comparative or ex-post facto research design (Gall, Gall, & Borg, 1999; Wiersma, 2000). Similarly to correlational methods, causal comparative designs are employed when, as is the case in the current study, random assignment is not possible and the investigation is conducted on intact groups (Borg & Gall, 1989). The advantage of this design is that it allows the investigator to explore the relationship between variables in situations where experimental manipulation is not possible (Wiersma, 2000). Causal comparative research involves the comparison of comparable samples that differ on a single critical variable. The critical independent variable in this component of the study is the presence of ASD.

Comparison groups employed in studies of adaptive behavior (a behaviorally defined characteristic with similarities to school functioning) of children with ASD have been made comparable on the basis of chronological age, gender, and level of functioning

(Kraijer, 2000). Comparability in terms of chronological age is needed because of the link between age and both cognitive ability and adaptive behavior. Accordingly, I attempted to recruit equal ratios of children for both groups from primary (6-9 years) and junior (9-12 years) elementary classes.

Because girls with ASD may be more severely affected by ASD (Boyd, 1998), it is important to have a comparable sex ratio in the comparison group. However, because of the recruitment difficulties that I described previously, the ratio of boys to girls in the study was impossible to control. Large disparities in the ratio of boys to girls would have introduced irrelevant variability that would have to be accounted for during the analysis and discussion of the results.

Mental age or IQ has commonly been used to equate comparison and ASD groups on level of functioning (Freeman et al., 1999; Jacobson & Ackerman, 1990; Schatz & Hamdan-Allan, 1995; Stone, Ousley, Hepburn, Hogan, & Brown, 1999; Van Meter, Fein, Morris, Waterhouse, & Allen, 1997). However, as has been described in the literature review, obtaining valid IQ scores of children with ASD is problematic. Reviews of the school records of the participants in this study confirmed that the difficulties involved in obtaining valid IQ scores on children with ASD are not limited to published outcome studies. Appendix E demonstrates that few of the participants with ASD had recent or complete intellectual assessments. As a result, it was necessary to follow the lead of previous researchers and secure an alternative to the use of mental age in establishing the comparability of the groups.

It was demonstrated in the literature review that adaptive behavior scores offer a number of advantages over mental age in studies comparing children with ASD to

children with mental retardation. However, because differences exist in the level and pattern of adaptive behavior scores between children with ASD and MR and children with ASD without MR, caution is advised in the use of adaptive behavior composite scores as a matching variable. In his comprehensive review, Kraijer (2000) found that although children with ASD demonstrated lower adaptive behavior composite scores and consistent differences in Socialization and Communication domains than did children without ASD matched on mental age, significant differences were not found in the self-help domain. This finding suggests that the level of self-help skill is a key indicator of functioning that may be used to establish comparisons between children with ASD and MR and children with MR.

Based on these findings, Kraijer (2000) argued that the self-help domain score of the VABS is a valid alternative to the use of mental age as a means of establishing comparison groups for studies that involve individuals with ASD. Accordingly, I used the self-help domain score of the VABS in this study to determine the comparability of the two groups. To ensure that the two groups were comparable on this variable, I attempted to recruit equal ratios of children from classes for children with mild and moderate delays, respectively, for the two groups to be compared.

Evaluative Component

Social validity has become an increasingly important consideration in the selection and evaluation of interventions for children with severe disabilities. Consequently, I also explored the social validity of the SFA in this study. Social validity includes the concepts of the acceptability of practices and procedures and the functional validation of those practices and procedures (Myers, McBride, & Peterson, 1996). An

underlying principle of social validity is that the effectiveness of an intervention should be judged by persons who are in the best position to influence educational outcomes (Voeltz & Evans, 1983). Studies of the social validity of assessment practices have addressed questions such as, Are professionals satisfied with the assessment model? Is the assessment model efficient with respect to the time involved in completing the evaluation? Does the assessment method provide information deemed useful in the development of intervention activities? (Myers et al., 1996).

I explored the social validity of the SFA by gathering data on teachers' impressions of the appropriateness of the SFA in the assessment of children with ASD and asked them to complete a 7-item scale that rates each of the subscale areas of the SFA immediately after its administration. I also asked the teachers to respond to four questions that are described under Assessment Procedures in this chapter.

Summary of Research Design

The mixed research design described in this section offered a number of advantages: (a) It enabled me to replicate the findings related to the convergent validity of the SFA with a group of children who were not adequately represented in the standardization sample of this instrument; (b) it allowed me to investigate the discriminant validity of the SFA, an element of the validity that has not been reported on in the literature; and (c) the inclusion of a functionally similar comparison group provided the opportunity to investigate the unique impact of ASD on school functioning.

Instrumentation

School Function Assessment

The purpose of the SFA is to evaluate an elementary school student's participation in the various school-related activity settings, his or her support needs, and his or her performance of specific school-related functional activities (Coster et al., 1998). The SFA uses a questionnaire format that may be completed by one or more school professionals who have had the opportunity to observe the student across school settings (Hwang et al., 2002). According to the manual, the SFA takes 1½-2 hours to complete.

The respondent rates the child across 312 items divided across three scales: participation, task supports, and activity performance. Part I: Participation utilizes a six point scale to rate the degree of the child's participation in six school settings. Part II: Task Supports are broken down into physical and cognitive/behavioral task supports. Each of these subscales consisting of two nine item subtests, one rating the level of assistance the child requires, the other rating the child's need for adaptations. Similarly, Part III: Activity Performance is also broken down into subscales involving physical task performance and cognitive/behavioral task performance. Physical task performance consists of 12 subtests while cognitive/behavioral task performance consists of nine subtests. Part II and III of the SFA use a four point rating system which ranges from "complete assistance to no assistance" for the support scale and "does not perform" to "consistent performance" for the activity scales.

The technical and administration describes the subtests included in the SFA as unidimensional and hierarchically ordered. Each item included within a subtest represents

increasingly more difficult or demanding aspects of task performance. Raw scores are tallied for each subtest and transformed into criterion scores with a range of 0-100. The SFA also includes a checklist that identifies adaptations required by the child in nine categories. These categories include activities of daily living, architectural, behavioral, classroom work, cognitive, communication, computer, seating/mobility/transportation and miscellaneous adaptations.

The SFA was standardized on a group of 363 students with a range of disabilities. The manual reports internal consistency ratings (Cronbach's Alpha) that range from .92 to .98 (Coster et al., 1998). Test-retest reliability data gathered on 29 students with disabilities at two-week intervals yielded a Pearson r that ranged from .80 to .99 across the three scales (Hwang et al., 2002). Comparisons across similar domains of the SFA and VABS-C produced r values of .56 to .72. Additional evidence of convergent validity in the form of discriminant analysis has been reported. The SFA correctly classified students into nonhandicapped, learning disabled, and physically disabled (cerebral palsy), 93.1%, 55.7%, and 88.2%, respectively (Hwang et al., 2002).

Vineland Adaptive Behavior Scale (VABS)

The VABS has been extensively used in outcome studies that involve children with ASD (Ludwig & Harstall, 2001). The purpose of the VABS is to provide a measure of social competence of handicapped and nonhandicapped individuals from birth to adulthood (Sattler, 1988). The VABS is not administered directly to the person being assessed: A responsible informant who is familiar with the individual's behavior is required. There are three versions of the VABS: Survey Form, Expanded Form, and Classroom Edition. I used the VABS-C and the Maladaptive Behavior Domain from the

Interview Edition in this study. The VABS-C focuses on school-related functional skills and thus represents an appropriate criterion measure with which to establish the convergent validity of the SFA. As noted, the Maladaptive Domain was selected for its brevity (36 items) and the fact that the scale follows the same rating format as the VABS-C.

The VABS-C contains 244 items related to adaptive behavior in the classroom and may be completed by the child's teacher in 20 minutes. For children aged 6 years and older, the VABS-C provides standard scores with a mean of 100 and a standard deviation of 15 in three domains: communication, daily living, and social skills. In addition, an adaptive behavior composite, which combines the scores of the three domains, is also available. The Classroom Edition does not include a maladaptive behavior domain. Supplementary norms have been developed based on a large sample of children and adults with ASD for the Interview Edition of the VABS (Carter, et. al., 1998). In this study I used the norms developed on a broad representation of the children and adults without disabilities.

Supports and Services Questionnaire

The supports and services questionnaire was specifically designed for this study (Appendix F). The questionnaire was designed to collect information from the child's school records and from school-based professionals who work directly with the child with ASD. The questionnaire includes sections on the process used to establish a diagnosis, the results of previous assessments, and information on class size, teacher-student ratio, teaching-assistant support, and the level of educational support services, including speech/language, occupational therapy, and behavioral consultation.

Teacher Feedback Rating Scale

I also designed the Teacher Feedback Rating Scale (TFRS) specifically for this study. The TRFS is a 7-item scale that rates teacher's evaluation of the appropriateness of each of the subscales of the SFA (Appendix G). Upon completion of the SFA, I asked the teachers to rate each section of the SFA on a 4-point scale on whether they felt that each subscale was *not appropriate*, *somewhat appropriate*, *appropriate*, or *very appropriate* for that child. For the purposes of this study, I based *appropriateness* on whether the section rates an important aspect of the student's functioning in the classroom and provides information that could be considered in developing the student's Individual Program Plan (IPP).

CHAPTER 5:

RESULTS

Chapter 5 presents assessment information that I collected throughout the course of the investigation. The chapter is divided into four major sections. The first section describes the characteristics of the participants that are relevant to understanding and interpreting the subsequent analysis of results. This section also uses the data obtained from the VABS-C, the Maladaptive Domain of the VABS, and the SFA to describe the overall classroom functioning of both groups of children. A primary purpose of this study was to investigate the validity of the SFA as a measure of the school functioning of children with ASD. Accordingly, the next section presents the results of the validity of the SFA based on the correlational analysis of the SFA with the VABS-C and the Maladaptive Domain completed on the children with ASD. The third section addresses the other primary purpose of the study: to describe the effect of ASD on school functioning through a comparison of the results of these assessments for both groups of children. The final section of this chapter presents the results of the teacher evaluation of the appropriateness of the SFA for children with ASD and their comments about its usefulness.

The results of the correlational, comparative, and evaluative components of this study are intended to address the research questions presented in Chapter 3.

Participants

Children With ASD

I obtained information on the participants from reviews of their school records and discussions with their teachers. Of the 24 participating children with ASD included in the study, 15 attended disability-specific classes for children with ASD, and the remainder attended classes for cognitively delayed students. All of these children attended low-enrollment classes of 6-12 students. The ratio of adults to children in these classes ranged from 1:1 to 1:3. The ASD group included 18 males and 6 females (a 3:1 ratio). The ages of the children ranged from 6.0 to 11.33 years, with a mean age of 8.46 years and a standard deviation of 1.65 years. Appendix H provides detailed information on the children's age, gender, and diagnosis and the specialists involved in making the diagnosis of ASD.

Of the 24 children with ASD, 18 had been diagnosed by a multidisciplinary team. Assessment reports obtained from the children's school records indicated that these teams typically included a developmental pediatrician, a speech and language pathologist, an occupational therapist, and a psychologist. The remaining six children were diagnosed by a single professional, two by a child psychiatrist, two by a pediatrician, and one by a chartered psychologist. Most of the children received a global diagnostic term such as *autism spectrum disorder*, *pervasive developmental disorder*, and *autism*. Only four of the children had one of the five specific diagnoses included under *pervasive developmental disorders* listed in the *DSM-IV*. I found references to autism-specific diagnostic instruments in the school records of seven (29%) of the children.

The school records included abundant descriptions of their developmental delays; however, only six of the children had a full scale or partial composite IQ score. Two of the school records included a notation that a cognitive assessment could not be completed because of the behavior of the child. The school records of 14 of the children included the results of an adaptive behavior scale (see Appendix I). Of the 24 children, 16 (67%) used verbal expression as their primary mode of communication, 3 used pictures or picture symbols, 1 used sign language, and the remaining 4 used primarily gestures.

Children With Cognitive Delays Without ASD

I also obtained information on the participants in the comparison group from reviews of the children's school records and discussions with their teachers. All of the children in the comparison group attended classes for cognitively delayed students. Like the children with ASD, the cognitively delayed group attended low-enrollment classes, with the ratio of adults to children ranging from 1:1 to 1:5. The cognitively delayed children included 10 males and 5 females. The ages of these children ranged from 6.42 to 12.67 years, with a mean age of 9.05 years and a standard deviation of 1.79 years. Although some of the children had a well-defined diagnosis such as Down syndrome or Soto syndrome, most had the more general diagnosis of global developmental delays, moderate cognitive disability, or mild cognitive disability (see Appendix J).

The school records of 11 of the children in this group contained the results of an intellectual assessment, an adaptive behavior score, or both. Two had other forms of developmental assessments that indicated delays of at least two standard deviations below the mean (see Appendix K). Standardized assessments were not available for two of the children in this group. The assessments identified 12 (80%) of the cognitively

delayed group as verbal, two used sign language, and one used gestures as his primary form of communication.

Teachers

I recruited a total of 15 teachers for this project. Background information was available for 14 of them. All had a minimum of a Bachelor of Education degree, two had a second degree at the bachelor's level, one had master's-level training in educational psychology, and two were enrolled in a graduate program. Ten of the teachers had specific training in special education. The amount of experience in teaching special education ranged from five months to approximately 20 years. Only one of the teachers had less than three years' experience in teaching children with disabilities. Approximately half of the teachers completed assessments on more than one child. The mean number of assessments completed per teacher was 2.6, with a range of between 1 and 6 assessments.

Descriptive Measures

I measured the adaptive behavior, the maladaptive behavior, and the school functioning demonstrated by children with ASD and the comparison group using the VABS-C, the SFA, and the Maladaptive Domain of the Interview Edition of the VABS. The results of these measures are presented here to describe the overall functioning of the participants within their classrooms. The results of the analysis of the similarities and differences in these scores will be addressed in the comparative section of this chapter. The description of the results for both groups of children begins with adaptive behavior.

Adaptive Behavior

I obtained the adaptive behavior scores for all of the participants. The VABS-C provides standardized scores with a mean of 100 and a standard deviation of 15 for three separate domains of adaptive behavior and a composite score. These scores are presented for both groups of children in Table 5.

Table 5

M, SD, and Ranges for the Composite and Domain Scores of the VABS-C for Children With ASD and Children with Cognitive Delays (CD)

	ASD ($N = 24$)		CD ($N = 15$)	
Adaptive behavior	*M(SD)*	*Range*	*M(SD)*	*Range*
Adaptive behavior composite	54.25 (13.96)	34-90	58.13 (10.51)	41-78
Communication domain	53.25 (17.66)	23-96	54.53 (16.72)	20-79
Daily living skills domain	55.08 (13.01)	39-88	55.67 (12.95)	39-88
Socialization domain	57.85 (14.97)	34-97	68.33 (10.04)	47-85

Children with ASD. Mean adaptive behavior scores for the children with ASD of approximately three standard deviations below the standardization mean for the composite and the three domain scores confirm the presence of significant delays across all areas of adaptive behavior. Unlike the results of previous investigations (e.g., Carter et al., 1998; Kraijer, 2000), this group of children with ASD did not demonstrate significant interdomain scatter in adaptive behavior scores.

Two of the participants in the ASD group received adaptive behavior composite scores that were greater than the criteria set for inclusion in the study. One had an IQ

score within the required range (e.g., at least 1.67 *SD* below the mean), thus meeting the criteria for inclusion. The other child's record did not include any standardized assessment data. The VABS-C completed during the course of the study was the only norm-referenced assessment data available for this child; consequently, I did not include these scores in the comparative component of the study.

Children with cognitive delays. Similar to children with ASD, the mean adaptive behavior scores including the adaptive behavior composite, the communication domain, and the daily living domain score for the comparison group were also approximately three standard deviations below the standardization mean. In contrast to the children with ASD, the socialization domain score for the comparison group is noticeably higher than the other domain scores. This group of children also included a child with an adaptive behavior composite score that was slightly above the cut-off criteria for the study. However, a recently completed IQ score obtained from the school record confirmed that the child met the inclusion criteria

Maladaptive Behavior

I administered the Maladaptive Behavior Domain of the Interview Edition of the VABS for two purposes. First, I used these scores in the analysis of the validity of the SFA for children with ASD. Second, I also used the maladaptive score to compare the school functioning and adaptation of both groups of children included in the study. The manual for the VABS Interview Edition provides ranges of scores for three levels of clinical significance of maladaptive behavior at different ages: *Nonsignificant, Intermediate*, and *Significant*.

The mean raw score on the Maladaptive Domain for the children with ASD was 19.08 (*sd* = 6.69) with scores ranging between 3 and 36. The mean raw score for the children in the comparison group is 14.07 (*sd* = .84), a range of scores between 6 and 30. Table 6 presents the proportion of children from both groups who fell into each of the three levels of clinical significance.

Table 6

Level of Significance of Maladaptive Behavior Demonstrated by Children With ASD and Children with Cognitive Delays (CD)

Level of clinical significance	ASD $N = 24$	CD $N = 15$
Nonsignificant	3 (12.5%)	4 (26.7%)
Intermediate	6 (25.0%)	4 (26.7%)
Significant	15 (62.5%)	7 (46.6%)

School Functioning

Using the SFA, I measured information on the level of participation, required assistance and support, and the performance of school-related functional skills of the children. The scoring procedure for the SFA requires that raw scores be transformed into criterion scores. The latter, with a range of 0-100, are based on the performance of a standardization sample of children with various disabilities. Table 7 presents the means, standard deviations, and ranges for composite scores for each of the three subcomponents of the SFA: participation, task supports, and activity performance. Task supports and activity performance have been further divided into subscales related to physical and

cognitive behavioral tasks. These composite scores are comprised of an unequal number of subtests.[2] For ease of comparison the scores have been averaged. Descriptive statistics for each of the individual subtests scores that make up the composite scores for the children with ASD and the comparison group are provided in Appendices L and M, respectively.

Table 7

M, SD, and Ranges for the Subscale Scores for Children With ASD and Children With Cognitive Delays Without ASD

	ASD $M = 24$		CD $M = 15$	
Subcomponents of the SFA	*M(SD)*	*Range*	*M(SD)*	*Range*
Participation	53.46 (23.28)	0-100	56.2 (11.23)	34-74
Task supports				
Physical task supports	64.75 (20.84)	19-100	59.20 (13.16)	36-85
Cognitive/behavioral task supports	35.08 (26.61)	0-92	40.93 (14.23)	0-59
Activity performance				
Physical tasks	67.00 (16.47)	38-100	63.80 (9.37)	48-84
Cognitive/behavioral tasks	40.25 (19.45)	11-86	48.80 (11.23)	29-65

[2] Participation involves a single subtest, physical and cognitive/behavioral task supports consists of two subtests, and cognitive/behavioral task activity performance include nine subtests. The physical task activity performance includes 12 subtests. Following the pattern established by Hwang et. al. (2002), three of the subtests—Up/Down Stairs, Computer Use, and Written Work—were not included because of lack of exposure or access in some schools.

The SFA also provides criterion cut-off scores that indicate mastery of the skill area included in the subtest. The technical and administrative manual of the SFA provides criterion cut-off scores at the Grades 3 and 6 levels. These scores are derived from the performance of nonhandicapped children. Because approximately 80% of the children in the ASD were under nine years of age and attended ungraded classes, the lower criterion cut-off score provides an appropriate comparison. These criterion cut-off scores are also provided in Appendices L and M.

Children with ASD. As expected, I noted a significant discrepancy between teacher ratings of the school functioning of children with ASD and age-appropriate, independent participation and performance of school-related functional tasks. This is particularly evident in the descriptive statistics for cognitive/behavioral supports and activity performance. The mean scores obtained by this group on cognitive behavioral task supports and performances were approximately one-third of the upper limit of the criterion scores. In contrast, the physical-task supports and activity performance were approximately two thirds of the upper limit of this range.

As is evident in the range and standard deviation of scores for each of the subtests of the SFA obtained for these children (see Appendix L) there was a great deal of variability in ratings both across individuals and across tests. Fourteen (58%) children in the sample failed to achieve mastery on any of the 23 subtests of the SFA; the remaining eight children met the criteria on between 1 and 21 of the 23[3] subtests.

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[3] Two of the children in the ASD group achieved criterion scores on an exceptionally high number of the subsets of the SFA (19 and 21, respectively). As noted, one of the children was removed from the comparative component of the study because of a lack of evidence of significant evidence of developmental delays, whereas the second child was included on the basis of an IQ score obtained from his school record.

The results of a factor-analytic study indicate that the construct of school function involves two major dimensions: cognitive behavioral function and physical function (Coster et al., 1999). As is evident from the descriptive statistics included in Table 7, children with ASD appear to require less support for and demonstrate higher levels of independence on physical than on cognitive behavioral tasks. Given these apparent differences, I conducted within-group comparisons involving *t*-tests for dependent samples on mean scores for physical task and cognitive/behavioral task supports and cognitive/behavioral and physical task performance. Keeping in mind the criteria for participation, it is not surprising that the results of these *t*-tests indicate that children with ASD require significantly more supports ($t_{23} = 10.013$, $p = .00$) and demonstrate significantly less independence on performance of cognitive/behavioral tasks than on physical tasks ($t_{23} = 13.812$, $p = .00$). The degree of difference in the level of support required by children with ASD in each of these respective areas is also evident in the number and types of supports identified by teachers on the SFA (Appendix N).

Children with cognitive delays. As is evident in Table 7, children with cognitive delays without ASD also demonstrated significantly lower levels of participation in school-related activities; significant task support needs, particularly related to cognitive/behavioral tasks; and lowered levels of activity performance than did children without disabilities. A comparison of the mean scores for physical task supports and cognitive/behavioral task supports indicated that, like the ASD group, these children also required significantly more supports ($t_{14} = 5.737$, $p = .00$) and demonstrated lower levels of performance on cognitive/behavioral tasks than on physical tasks ($t_{14} = 5.572$, $p = .00$). Also like the ASD group, children with cognitive delays were provided with a

higher level of adaptations in the areas of cognitive and behavioral functioning (Appendix N). However, as the data in Table 7 indicate, the range of scores is more restricted in this group. In addition, the difference in the means obtained on supports and task performances related to cognitive/behavioral tasks compared to physical tasks is less pronounced than in the children with ASD.

Eleven of the children (73%) in this group failed to meet the criteria on any of the subtests. None of the children in the comparison group achieved criterion on more than four of the subtests of the SFA.

Convergent and Discriminant Validity of the SFA

I explored the convergent and discriminant validity of the SFA through a series of Pearson product-moment correlations between the SFA and the VABS-C and the Maladaptive Domain of the Interview Edition of the VABS. Because sample size influences the accuracy of correlations (Hinkle, Wiersma, & Jurs, 1994), I included all of the children with ASD for whom a complete data set was available ($n = 24$) in this component of the study.

I completed all correlations using SPSS/PC+ version 12.0. The convergent validity component of the study followed the procedures that Hwang et al. (2002) described. The results of these analyses are reported for the composite scores of both measures and comparable subsections of the SFA and the VABS-C. For the discriminant validity component of the study, I explored the full pattern of relationships through a matrix of correlations involving composite and subsection scores for the SFA and the VABS-C. In addition, I calculated the correlations between the total score for the maladaptive score of the VABS and total scores of each of the five subscales of the SFA.

The results related to the convergent validity of the SFA with the VABS-C are reported first.

Convergent Validity

Correlations between Composite Scores of the SFA and VABS-C. In the convergent validity study of the SFA, Hwang et al. (2002) examined the relationship between the adaptive behavior composite score of the VABS-C and the composite score of the SFA. The composite score of the SFA in that study included Part I: Participation and Part II: Task Supports (physical tasks assistance, physical tasks adaptations, cognitive/behavioral tasks assistance, and cognitive/behavioral tasks adaptations). Part III: Physical Task and Cognitive/Behavioral Task Performance was not included in the calculation of the total score of the SFA (see Table 4 in the Methods chapter). However, because the VABS-C is a standardized measure of functional task performance, conceptually, the inclusion of the task performance scales of the SFA would seem to be important in determining the convergence between the two measures. Accordingly, I calculated Pearson product-moment correlations between the SFA composite without the task performance scales (SFA-Comp) and with the task performance scales (SFA-Total).

Table 8 shows that the correlation (r) between the VABS-C and these two scores of the SFA are moderately high (r_{24}= .62 with the SFA-Comp and .65 for the SFA-Total). Visual inspection of bivariate scatter plots indicated positive linear relationships and an absence of outliers. Together these data provide evidence of the convergent validity of the SFA with the VABS-C. It is interesting that adding the physical activity performance

and cognitive activity performance scales of the SFA resulted in only slightly increased strength of the correlation.

Table 8

Comparison of Pearson Product Moment Correlation Co-efficients (R) Between the VABS-C Adaptive Behavior Composite and the SFA Composite and the SFA Total for Children With ASD

Comparison ($N = 24$)	r	Significance (two tailed)
ABS-comp and SFA-comp	.62*	.00
ABS-comp and SFA-total	.65*	.00

*Correlation is significant at the .01 level (2 tailed)

Correlations between comparable sections of the SFA and the VABS-C.

Following the pattern outlined in Table 4 (p. 60), I formed conceptually similar sections of the SFA comparable to the domains of the VABS based on a pattern first formulated by Coster (1998) and reported by Hwang et al. (2002). Following the procedure that Hwang et al. outlined, I averaged the scores from individual scales to form composite scores for communication, daily living, and socialization skills, which these investigators entitled *SFA-communication*, *SFA-daily living*, and *SFA-socialization*. For example, I averaged the scores from five scales, including following social conventions, compliance with directives and rules, task behavior/completion, positive interaction, and behavior regulation, to form SFA-Socialization. I then calculated the correlations between each of the composite section scores of the SFA and comparable domain scores of the SFA (see Table 9).

Table 9

Comparison of the Correlations Between the SFA and the VABS-C With Children With ASD and a Combined Group of Children With Learning Disabilities (LD) and Cerebral Palsy (CP) as Reported by Hwang et al. (2002)

Comparable sections	ASD ($n = 24$)	LD-CP ($n = 35$)
Communication	.63*	.61*
Daily living	.57*	.60*
Socialization	.71*	.72*
Composite	.66*	.56*

*Correlation is significant at the .01 level (2 tailed).

Using the rules of thumb that Hinkle et al. (1994) described, correlations between SFA-communication and the communication domain and SFA-daily living and the daily living skills domain fell into the significant and moderately high range (r_{24} = .63 and .57, respectively), whereas the correlation between the socialization skills domain of the VABS and SFA-daily living fell into the high positive range (r_{24} = .71). As Table 9 demonstrates, these correlations were remarkably similar to those that Hwang et al. (2002) obtained on a combined group of children with cerebral palsy and learning disabilities.

Discriminant Validity

Correlation between all scales of the SFA and VABS-C. At the level of individual comparisons between conceptually similar scales of the VABS-C and the SFA, the results were consistent with predicted patterns and outcomes of previous research with groups of children with other forms of disabilities. However, as Campbell and Fiske

(1959) pointed out, it is necessary to examine the full pattern of relationships between measures to determine both the convergent and the discriminant validity of a new measure. To explore the relationships between all of the various scales, I created a correlational matrix that included the composite and comparable section scores of the VABS-C and the SFA. These correlations are presented in Table 10.

Table 10

Correlational Matrix for Composite and Comparable Sections of the VABS-C and the SFA

		VABS-C				SFA			
		Comm	DL	Social	Comp	Comm	DL	Social	Comp
VABS-C	Comm	1							
	DL	.89*	1						
	Social	.93*	.86*	1					
	Comp	.97*	.96*	.96*	1				
SFA	Comm	.63*	.58*	.66*	.67*	1			
	DL	.52*	.57*	.65*	.60*	.94*	1		
	Social	.65*	.69*	.71*	.72*	.88*	.87*	1	
	Comp	.55*	.61*	.69*	.62*	.90*	.89*	.93*	1

*Correlation is significant at the .01 level (2 tailed).

A number of important observations can be made from inspecting these data. First, although all of the correlations are significant at the .01 level, the relationship between sections of both instruments that are purported to measure similar traits (multimethod-monotrait) are not necessarily stronger than the relationship between measures of traits thought to be different (multimethod-multitrait). For example, the daily living skills domain of the VABS-C correlated at .57 with the daily living skills section of

the SFA and the .65 level with the socialization domain of the VABS-C. Second, all of the correlations between measures of different traits using the same instrument (monomethod-multitrait) were stronger than the correlations between measures of the same trait measured by the two different instruments (monotrait-multimethod). Third, the pattern of internal correlations was similar for the two measures. For example, the correlations between the composite scores and communication scores of both the SFA and the VABS-C were higher than the correlations between the composite and daily living scores. Thus, only one of Campbell and Fiske's (1959) criteria for discriminant validity have been met in the correlational matrix involving the VABS-C and comparable sections of the SFA.

Correlation between the Maladaptive Domain and the SFA. Conceptually, maladaptive behavior should be incompatible with adequate school functioning as defined by high levels of participation, low support needs, and the ability to perform a wide range of physical and cognitive/behavioral tasks. Further, the performance of physical tasks should be less affected by the presence of maladaptive behavior than is the performance of cognitive/behavioral tasks. Accordingly, negative correlations could be expected between all of the subscales of the SFA and the Maladaptive Domain of the VABS. However, it would also be expected that the strength of the correlation would be considerably stronger for measures related to cognitive/behavioral tasks than to physical tasks. I tested this prediction by examining the relationship between the total score on the Maladaptive Domain of the VABS and Parts I, II, and III of the SFA.

Following the grouping of skill sequences described in the manual (Coster et al., 1998), I divided Part II of the SFA into physical task supports and cognitive/behavioral

task supports and Part III into physical task performance and cognitive/behavioral task performance. I then calculated the correlations between these scores and the Maladaptive Scale. As Table 11 illustrates, participation in school activities, low levels of required supports, and performance of school-related activities were each negatively correlated with maladaptive behavior. In addition, I obtained the strongest negative correlation between cognitive/behavioral supports and maladaptive behavior, followed by cognitive/behavioral task performance; and the weakest relationship appears to be between maladaptive behavior and physical task performance. However, all of the correlations were significant. In addition, differences in the magnitude of the correlations was not as great as one would predict based on the content of each of the subscales of the SFA.

Table 11

Comparison of Pearson Product Moment Correlation Co-efficients (r) Between the Maladaptive Domain of the VABS and the SFA

Comparison ($n = 24$)	r	Significance (two tailed)
Part I: Participation	-.57*	.004
Part II: Tasks Supports		
Physical	-.64*	.001
Cognitive/behavioral	-.77*	.000
Part III: Activity Performance		
Physical	-.55*	.007
Cognitive/behavioral	-.68*	.000

*Correlation is significant at the .01 level (2 tailed).

Summary of Results on the Convergent and Discriminant Validity of the SFA

As expected, selected correlations between the composite and conceptually similar sections of the VABS-C and the SFA were in the moderately high to high positive range. Visual inspection of a correlational matrix involving the composite and section scores of both of the measures revealed a pattern of moderate to very high positive correlations across all subscales. Correlations between the subscales of the SFA that were purported to be similar to the domains of the VABS-C were not necessarily stronger than correlations with other sections. The internal correlations for both scales were generally stronger than the correlations with similar subscales across measures.

Also, as expected, the Maladaptive Domain of the VABS was negatively correlated with the SFA. High teacher ratings of maladaptive behaviors were associated with low levels of participation, greater needs for supports, and decreased independent performance of school-related tasks. I found a marginally stronger relationship between maladaptive behavior and the need for cognitive/behavioral supports and cognitive/behavioral task performance than for either physical task supports or physical task performance.

Comparison of School Functioning

The second major purpose of this study was to examine the specific effects of ASD on school functioning. I achieved this component of the investigation through comparing adaptive behavior, maladaptive behavior, and SFA scores of the ASD and comparison groups. The results of this component of the study begin with the variables considered important in establishing the comparability of the two groups.

Comparability of Groups

I included a total of 15 children with developmental disabilities without ASD and 23 children with ASD in this component of the study. As noted in the description of the participants, the ratio of boys to girls was approximately 3:1 for children with ASD and 2:1 for the comparison group (see Table 12). The proportion of girls in the ASD group was slightly higher than the 1:4 reported in the literature for the broad spectrum of autism-related disorders. However, girls with ASD are more likely to experience mental handicaps (Boyd, 1998; National Research Council, 2001). Because the criteria for participation included evidence of significant cognitive delays and placement in congregated classrooms for children with disabilities, it would be expected that the proportion of girls in the ASD group would be higher than the ratio reported for the larger population.

Table 12

Comparison of Participants With ASD and Children With Cognitive Delays (CD) Without ASD on the Matching Variables

	ASD (6 girls:17 boys)	CD (5 girls:10 boys)
Matching Variables	*M(SD)*	*M(SD)*
Age in years	8.51 (1.97)	9.05 (1.67)
Daily living skills domain	53.87 (11.83)	55.87 (12.95)

A *t*-test for independent samples conducted on the two groups did not indicate significant differences in mean ages ($t_{36} = .944$, $p = .35$). Visual inspection of box plots (see Appendix O) suggested similar levels of dispersion, as indicated by the similarity in

the length of the interquartile range, along with considerable overlap in the boxes representing this range. Similarly, a *t*-test for independent samples of the mean difference of the daily living skills domain of the VABS-C for those with ASD ($M = 53.87$, $SD = 11.83$) and those without ASD ($M = 55.87$, $SD = 12.95$) did not differ significantly ($t_{36} = .441$, $p = .662$). Similar levels of dispersion were also noted in the box plots and histograms completed on the scores obtained for the daily living skills domain (see Appendix P). Measures of equality of variance (Levene's test) for the two groups did not differ either. From these data it can be concluded that, for the purposes of this study, both groups of children were similar in terms of age and daily living skills.

Comparison of Adaptive Behavior, Maladaptive Behavior, and School Functioning

The original research proposal called for the use of multivariate techniques, including the Hotelling T-square test and discriminant function analysis, to determine whether a distinctive pattern of scores could be used to classify the participants correctly into their two respective diagnostic groups. However, initial analysis using Box's M test indicated that the data violated the prerequisite assumptions necessary for appropriate application of these techniques. Specifically, the combination of small sample size, heterogeneity of the variance-covariance matrices, and unequal groups precluded the use of these tests. Hotelling T-square tests, for example, are sensitive to heterogeneity of the variance-covariance matrices when there is a substantial difference in group sizes. Discriminant function analysis, on the other hand, is robust with respect to heterogeneity of the variance-covariance matrices, but only when the sample sizes are equal or large. In

addition, cases tend to be overclassified into groups when there is a great deal of dispersal in the data.

I compared the two groups on the composite and three domain scores of the VABS-C, the Maladaptive Domain of the VABS, and five subscales of the SFA variables through a series of *t*-tests for independent samples (Table 13). The use of *t*-tests for multiple comparisons of sample means increases the risk of experiment-wise Type 1 error (Hinkle et al., 1994). Accordingly, I chose the more conservative alpha level of .01. *T*-tests carried out on SPSS/PC+ version 12.0 include Levene's test for homogeneity of variance and provide *t* statistics where equal variances can be assumed and where they cannot be assumed (Welch's *t*-test). Levene's test evaluates the assumptions that the variances are homogeneous. When the results of the Levene's test were significant, indicating that the assumption of homogeneity has not been met, the results of Welch's *t*-test are reported.

I also explored these data through box plots, stem and leaf graphs, and histograms to determine whether the data met assumptions of normality and equality of variance. When there was compelling evidence that these assumptions were not met in the data, I also performed nonparametric equivalents of the parametric tests. The results of the comparisons are discussed with reference to adaptive behavior, maladaptive behavior, and school functioning.

Adaptive behavior. Table 13 provides *T* values and significance levels for comparisons of means for the two groups on the VABS-C for the adaptive behavior composite and the domain scores. Comparison of the mean scores suggests that the two groups were remarkably similar in most aspects of adaptive behavior as operationalized

in the VABS-C. The differences in adaptive behavior composite scores for both groups were not significant; neither were the teachers' ratings of communication skills and, as previously noted, daily living skills. However, consistent with previous research (Carter et al., 1998; Kraijer, 2000), the children with ASD demonstrated significantly lower levels of school-related social skills (socialization domain) than did the children with cognitive delays without ASD.

Table 13

M, SD, and Results of t-Tests on the VABS-C, the Maladaptive Domain of the VABS Interview Edition, and the SFA for the Groups with ASD and With CD without ASD[a]

	ASD	CD		
Comparative measures	*M(SD)*	*M(SD)*	*T*-value	Sig.
Adaptive Behavior (VABS-C)				
Communication	51.39 (15.48)	54.53 (16.72)	.593	.56
Daily living skills	53.87 (11.83)	55.67 (12.94)	.441	.66
Socialization	55.74 (10.40)	68.33 (12.44)	3.281	<.01*
Composite	52.70 (10.52)	58.13 (10.52)	1.413	.16
Maladaptive Behavior (VABS)				
Maladaptive Behavior Domain	19.70 (9.63)	14.07 (7.84)	-1.92	.06
School Functioning (SFA)				
Participation	51.4 (21.5)	56.2 (11.2)	.79	.44
Physical task supports	126.7 (39.8)	117.9 (39.8)	-.71	.48
Cognitive/behavioral supports	65.0 (48.56)	48.6 (28.4)	1.34	.19[b]
Physical activity task performance	588.9 (139.0)	588.9 (81.0)	.03	.10
Cognitive/behavioral task performance	345.3 (155.0)	439.5 (101.1)	2.08	.05

Note. [a]*t*-test for independent samples; $df = 36$. [b]Welch's *t*-test.
**T*- value is significant at the .01 level (2 tailed).

Maladaptive behavior. The *t*-test for independent samples conducted on the two groups did not indicate significant differences in the mean ratings of maladaptive behavior. However, visual inspection of box plots and histograms suggested a greater level of dispersion in the ASD group, with positive skewing in the children with cognitive delays without ASD (Appendix Q). The shape and spread of the scores obtained for both groups suggested that proportionately more children with ASD had higher levels of maladaptive behavior than the children in the comparison group did. I explored the possibility of a significant difference in the distribution of scores through a Mann-Whitney *U* test. The result of the *U* test was marginally more significant ($z_{36} = -2.05$, $p = .04$). Finally, as illustrated in Figure 1, a higher proportion of children with cognitive delays without ASD demonstrated nonsignificant levels of maladaptive pattern, whereas a greater proportion of the ASD group fell into the *clinically significant* range.

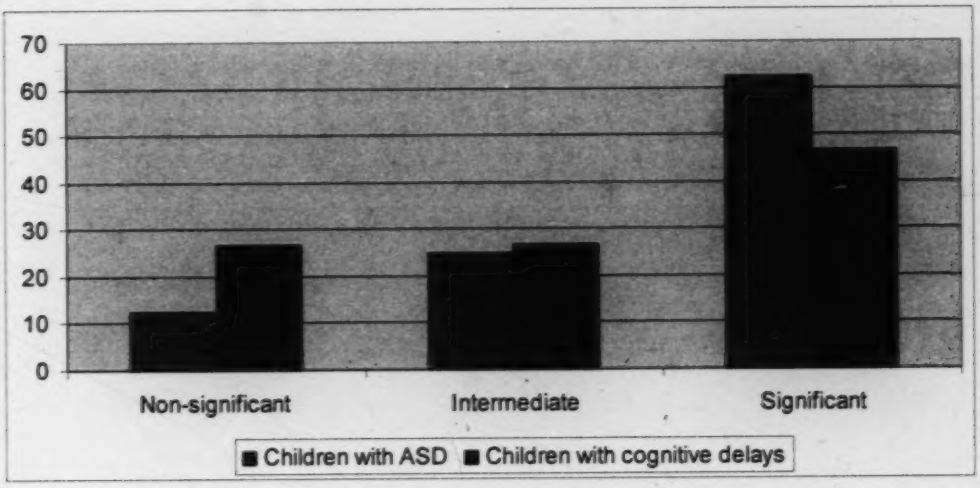

Figure 1. Comparison of clinical significance levels.

School functioning. Examination of the similarities and differences in the level of school functioning between the two groups of children involved comparing the performance of each group of children on each of the five subsections of the SFA as described in the manual (Coster et al., 1998). Table 13 presents the results of these comparisons. Using the conservative alpha level of .01 to identify significant differences shows that both groups of children demonstrated similar levels of participation, required similar physical and cognitive task supports, and displayed similar physical and cognitive/behavioral task performance.

Again, visual inspection of the data through box plots and histograms (Appendices R and S) suggested that nonparametric comparisons may be more appropriate for two of the scales: cognitive/behavioral task supports and cognitive/behavioral task performance. To test for the hypothesis of no difference in the distributions of scores, I performed Mann-Whitney *U* tests on these scales. The results of the *U* test carried out on the cognitive/behavioral support scale were nonsignificant (z_{36} = -.82, p = .20). However, the observed *z* value approached the established significance level of .01 for cognitive/behavioral task performance (z_{36} = -2.20, p = .03).

Comparison of the cognitive-behavioral subtests of the SFA. Although none of the comparisons on the subscales of the SFA achieved the alpha level of .01 required to make a clear determination of statistical significance, at least three compelling factors indicated that further analysis of the cognitive/behavioral activity performance was warranted. First, based on diagnostic criteria, behavioral characteristics and the uneven cognitive profiles associated with ASD differences in school functioning would most likely be expected in the area of cognitive/behavioral functioning. Second, differences in

the mean, median, and distribution of scores on the cognitive/behavioral subscale certainly approached the required level of significance. Third, the possibility of a spuriously high rating associated with one individual in the ASD group masking a significant difference could not be ruled out.[4] These reasons provided sufficient justification for the investigation of potential differences in school-related cognitive/ behavioral activity performance. Accordingly, I compared the nine tests that comprise the cognitive/behavioral scale (Table 14).

Visual inspection of the data suggests that the assumptions of normality and equality of variance did not apply to memory and understanding and task behavior/ completion tests (Appendices T and U). However, the results of Mann-Whitney *U* tests carried out on these two tests were nonsignificant (z_{36} = -1.24, p = .22 and z_{36} = -1.91, p = .06, respectively). Applying the alpha level of .01 to these data shows that children with ASD were similar to those without ASD in most skill areas related to cognitive/ behavioral functioning. It is important to note, however, those with ASD demonstrated significantly lower levels of functional communication skills and behaviors associated with personal safety (safety). I also obtained differences that approached significance (p = .03) for a measure of skills required for social interaction (positive interaction).

Again, removal of a single outlying score from the ASD group significantly increased the level of significance for a number of subtests (see Table 15). With this

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[4] One participant in the ASD group was rated as achieving mastery on 21 of 23 subtests of the SFA, and also constituted an outlier in the comparison on the cognitive/behavioral subscale (Appendix S). This individual's Adaptive Behavior Composite score on the VABS-C completed by his teacher exceeded the criteria established for inclusion in the study. He was, however, included in the comparative component of the study based on limited file information. A *t*-test carried out on the cognitive/behavioral subscale with this individual's score removed resulted in a difference that was significant at the .01 level.

Table 14

M, SD, and Results of T-Tests for the Cognitive-Behavioral Tests of the SFA for Children With ASD and Children With CD

	ASD	CD		
Cognitive-behavioral tests	M (SD)	M(SD)	T-value	Sig.
Functional communication	34.48 (17.12)	49.33 (16.76)	2.64	.01**
Memory and understanding	48.87 (19.31)	53.67 (9.92)	1.01	.32[b]
Following social conventions	34.13 (20.03)	45.47 (12.33)	1.96	.06
Compliance with adult directives and school rules	45.04 (17.47)	52.53 (11.90)	1.45	.16
Task behavior/completion	36.35 (17.27)	42.07 (9.94)	1.16	.25[b]
Positive interaction	35.35 (19.33)	48.13 (12.76)	2.26	.03
Behavior regulation	36.74 (16.84)	44.53 (11.01)	1.58	.12
Personal care awareness	43.30 (21.41)	56.00 (16.85)	1.94	.06
Safety	31.00 (21.32)	47.73 (16.39)	2.58	.01**

Note. [a]*t*-test for independent samples, $df = 36$. [b]Welchs's *t*-test. **T- value is significant at the .01 level (2 tailed). Level of significance rounded to the second decimal point

Table 15

M, SD, and Results of T-Tests for the Cognitive-Behavioral Tests of the SFA for Children With ASD and Children With CD With Outlier Removed

	ASD	CD		
Cognitive-behavioral tests	*M (SD)*	*M(SD)*	*T*-value	Sig.
Functional communication	32.77 (15.39)	49.33 (16.76)	3.10	<.01**
Memory and understanding	46.86 (17.14)	53.67 (9.92)	1.38	.18
Following social conventions	34.13 (20.03)	45.47 (12.33)	1.96	.02
Compliance with adult directives and school rules	44.05 (17.19)	52.53 (11.90)	1.66	.11
Task behavior/completion	34.18 (14.13)	42.07 (9.94)	1.87	.07
Positive interaction	33.27 (16.97)	48.13 (12.76)	2.88	.01**
Behavior regulation	35.04 (15.10)	44.53 (11.01)	2.08	.05
Personal care awareness	41.09 (19.03)	56.00 (16.85)	2.45	.02
Safety	28.73 (18.76)	47.73 (16.39)	3.18	<.01**

Note. [a]*t*-test for independent samples, $df = 35$. **T- value is significant at the .01 level (2 tailed). Level of significance rounded to the second decimal point.

individual's score removed I obtained significant differences on the positive interaction subtest and differences approaching the required level for following social conventions ($p = .02$) and personal care awareness ($p = .02$).

Summary of the Results of the Comparisons

A comparison of age, sex/ratio, and self-help skills suggests that the two groups were comparable on a number of variables related to school functioning. In the area of adaptive behavior the children with ASD had significantly lower levels of socialization skills. I noted differences that approached significance in comparisons involving the median and the distribution of maladaptive behavior scores. Of the five subscales of the SFA, only the differences in cognitive/behavioral task performance scale approached significance.

Based on the possibility of significant differences within cognitive/behavioral functioning and the relevance of these skills to the core characteristics of ASD, I made comparisons across the nine subtests of the cognitive/behavioral task performance subscale of the SFA. This analysis revealed significant differences on measures of functional communication and safety, with comparisons on a test of positive interaction approaching the required level of significance.

Social Validity of the SFA

I determined the social validity of the SFA from the teachers' ratings of each of the subscales of the SFA and brief interviews following the completion of the assessment package. The results of this evaluation are provided primarily through description and visual presentation of the data.

Teacher Ratings of the SFA

I directed the teachers to rate the appropriateness of the SFA on the Teacher Feedback Rating Scale (TRFS).[5] I defined *appropriateness* in terms of whether each section rates an important aspect of the student's functioning and provides information that could be considered in the child's IPP. I developed the TRFS based on the results of the pilot study. Consequently, teacher ratings are not available on the SFAs completed for the four children included in the pilot. Also, I did not use one TFRS in the analysis because of missing data on one scale.

Completed TRFSs were available for 19 of the 24 children with ASD who participated in this study. Figure 2 presents the cumulative teacher ratings for each of the subscales, ranked from lowest to highest. As Figure 2 illustrates, the cumulative teacher ratings were highest for cognitive/behavioral assistance, which received a rating of 40 out of a maximum possible rating of 60, followed by cognitive/behavioral tasks (37). The teachers assigned the lowest ratings to physical task adaptations (30) and physical tasks (31).

Correlation between adaptive behavior and teacher ratings. Based on the results of the pilot study, I hypothesized that the teachers' ratings of appropriateness may be related to the age and/or functional level of the child being assessed. Specifically, the follow-up interview with the teacher during the pilot study indicated that the SFA may not break down skill sequences finely enough for younger or more cognitively challenged children. To test this hypothesis, I calculated Pearson product-moment correlations for

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[5] To provide maximum specificity, adaptation and assistance tests for both physical and cognitive/behavioral supports were rated as separate subsections.

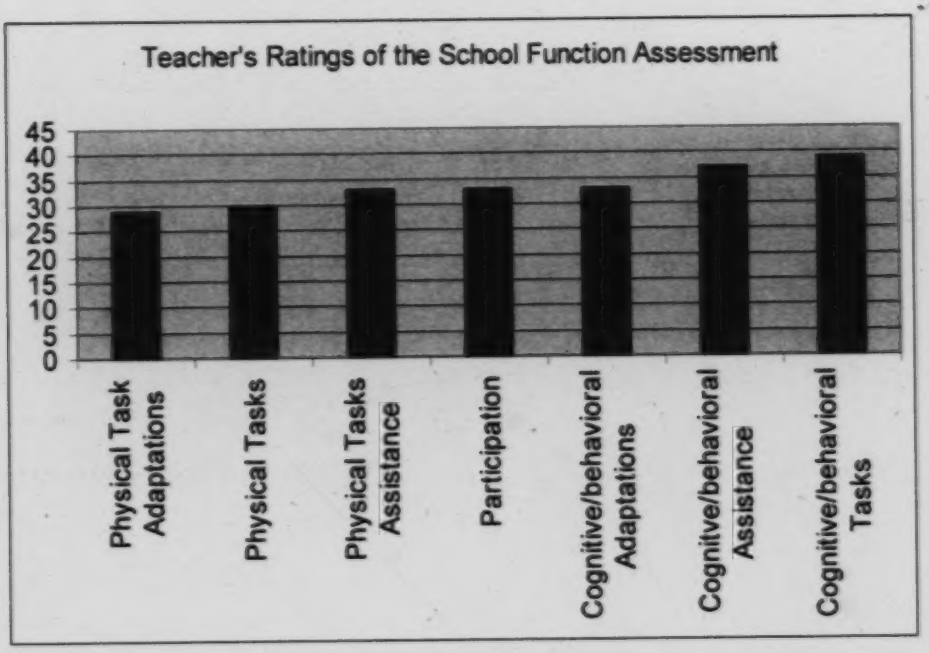

Figure 2. The cumulative teacher ratings for each of the subscales.

the total teacher ratings of the SFA and the age and adaptive behavior composite of the child. These correlations suggest that there was no relationship between age and total rating or adaptive behavior composite and total rating (r = .01, p = .96 and r-.333, p = .34, respectively).

Results of the Teacher Interviews

After I completed the assessments, I conducted a brief interview with 14[6] of the 15 participating teachers. I asked them to respond to four questions related to the perceived usefulness of the SFA. It should be noted that some of the teachers completed

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[6] One of the teachers had experienced a sudden and serious family illness and was not available for interview.

assessments for children from both groups, and I therefore determined that it would be difficult for them to focus their responses on the ASD group alone. Accordingly, the following responses should be interpreted as related to the perceived usefulness of the SFA for children with significant developmental disabilities, including children with ASD. The teachers' responses to each of the questions are described in Appendix V and summarized in the following section:

Question 1: How much time was required to complete the two primary instruments (SFA and VABS-C)?

The time required to complete an assessment of the evaluation is an important determinant of its social validity (Myers et al., 1996). I therefore asked the teachers to estimate the amount of time involved in completing the SFA. In addition, to provide some comparison to a widely used and accepted measure of school-related functional skills, I also asked them to estimate the time required to complete the VABS-C. Figure 3 presents this comparison. The estimates of the time required to complete the SFA ranged from 30 minutes to in excess of three hours. Five (36%) of the teachers estimated that the average time to complete an SFA was 60 minutes or less, two (11%) estimated between 60 and 90 minutes, four (29%) indicated between 90 and 120 minutes, and the remaining three teachers (21%) reported that their completion of the SFA exceeded 2 hours. Two of these teachers reported that the completion of the first SFA required the better part of a day. Four of the teachers used the phrase *time consuming* in reference to the SFA during the follow-up interviews. As is evident in Figure 3, the SFA required a greater investment of teacher time than the VABS-C did.

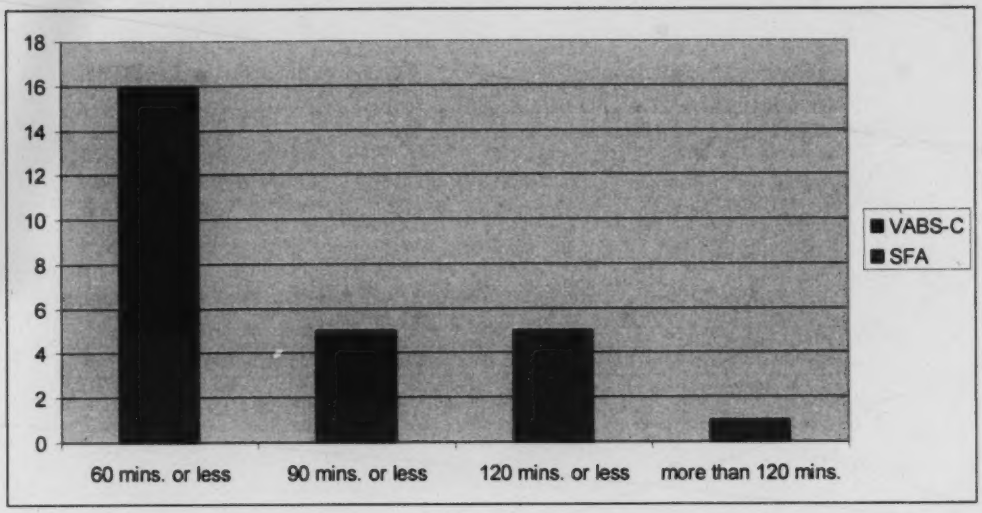

Figure 3. Teacher estimation of time required to complete the SFA and VABS-C.

Question 2: Was the SFA useful?

The social validity of an instrument is also linked to whether it provides clear information linked to relevant goals and objectives (Myers et al., 1996). Accordingly, I asked the teachers to comment on the usefulness of the SFA. Of the 14 teachers interviewed, 12 (86%) felt that the SFA was useful.

The teachers were not blind to the purposes of the study and therefore may have provided biased responses. However, their spontaneous comments suggest that they were able to identify a number of specific strengths of this instrument. These comments included the perceived comprehensiveness of the SFA as is evident in the number of items in each skill area, a scoring system that credits partial performance, its measurement of necessary assistance and supports; and its usefulness for identifying relevant goals for IPPs.

As I previously mentioned, the administration time was the most frequently mentioned shortcoming of the SFA. Other shortcomings included the lack of a sufficient range of items at the lower end of the subtests, the size of the gap between skills in the subtests, and the lack of an explicit link to the provincially mandated curriculum. One of the teachers with onsite access to a multidisciplinary team commented that most of the information provided by the SFA was already available to her from an onsite multidisciplinary team.

Question 3: Which components of the SFA were relevant to the needs of your students?

Seven of the teachers identified the cognitive/behavioral components of the SFA as the most relevant, followed by task supports (3), participation (3), and physical tasks (1).

Question 4: Which instrument (SFA or VABS-C) provided more relevant information?

Eight teachers (57%) explicitly stated that they preferred the SFA. Their reasons are identified under question 2. Three teachers (21%) indicated that they preferred the VABS-C. The reasons that these teachers gave for preferring the VABS-C included their familiarity with the instrument, the shorter time required for completion, a scoring system that allows for estimated performance, and the provision of normative information, including age-equivalent scores. One teacher felt that the socialization domain of the VABS-C provides items that were more applicable to her students. Two teachers (14%) did not explicitly state a preference, but referred to the usefulness of the SFA in developing an IPP. The remaining teacher stated that she was unsure which instrument she preferred.

Summary of Social Validity of the SFA

The teachers rated cognitive/behavior task performance and cognitive/behavior supports as the most appropriate subscales of the SFA for identifying IPP goals for children with ASD. Neither age nor the adaptive-behavior level of the child assessed appeared to have a significant impact on the teachers' ratings of the appropriateness of this measure with this population of children.

With regard to their perceptions of the usefulness of the SFA with children with developmental disabilities, approximately 87% of the teachers interviewed felt that the SFA was useful, 57% preferred the SFA, and 21% preferred the VABS-C. The teachers identified the number of items, the comprehensiveness, and a rating system that credits supported performance as advantages of the SFA. The most common criticism of the SFA that they identified during the follow-up interviews was the time required for completion.

CHAPTER 6:

DISCUSSION

The purposes of the current investigation were twofold: 1) to investigate the validity and utility of the SFA as an outcome measure for children with ASD and 2) to examine the impact of ASD on school functioning. In this chapter I will discuss the results of the study with reference to each of these purposes. This discussion will follow the pattern established in the previous chapter and will begin with the descriptive information that I gathered from the participants, followed by a critical analysis of the evidence related to the convergent and discriminant validity of the SFA, a comparison of the school functioning of children with ASD to that of children with cognitive delays without ASD, and the teachers' perceptions of the usefulness of the SFA. The chapter ends with a discussion of the limitations of the study and the implications for future research.

The Sample

The degree to which the results of this study can be generalized to other children with ASD depends primarily on whether the participants are representative of a larger population. The criteria used for inclusion in the study resulted in constituting a subpopulation within the very broad spectrum that is ASD. Specifically, these children were of elementary school age, attended congregated special-education classes, had a diagnosis within the autism spectrum, and demonstrated significant developmental delays. Although there is a certainty about the age and classroom placement of the participants, their diagnosis and level of function are open to further discussion.

Diagnosis

Their respective school jurisdictions identified the children who participated in the study as having ASD and as meeting provincial eligibility requirements for severe disabilities coding on the basis of their diagnosis of ASD and associated functional difficulties. The absence of standardized diagnostic instruments or a common diagnostic protocol in the majority of the children's school records is problematic from a research perspective. Diagnosis of ASD obtained from educational records is particularly prone to *diagnostic substitution*, or the use of a preferred but less accurate diagnosis (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). However, to some extent, uncertainty about diagnosis is countered by the fact that the majority of the children included in the study were diagnosed by a multidisciplinary team at the regional autism assessment center. The use of a multidisciplinary diagnostic/assessment process by a team of professionals with experience in ASD is a recommended practice that increases the likelihood that the majority of children were appropriately diagnosed (National Research Council, 2001).

With respect to the children in the comparison group, reviews of their school records suggested that only one of the children had been considered for a diagnosis of ASD, and it was subsequently ruled out. Furthermore, in Alberta, school jurisdictions receive a significantly higher level of funding for children with ASD than for those with cognitive disabilities without ASD (Alberta Learning, 2004). Consequently, there is a greater likelihood of overidentification of ASD rather than of underidentification. It is therefore unlikely that the comparison group included children with ASD.

Level of Function

There were only a few actual school records of recent cognitive or adaptive behavior assessments for the participants with ASD. The mean adaptive behavior score of three standard deviations below the mean obtained for these participants during this study confirmed the claims in their school records of significant developmental delays. Further, the higher IQ of children with ASD placed in regular classes suggests that participants drawn from congregated programs are more likely to experience cognitive disabilities (Eaves & Ho, 1997; Harris & Handleman, 2000). The one child for whom the presence of significant developmental delays could not be confirmed was excluded from the comparative component of the study.

Clearly, the study would have been enhanced by the use of independent diagnostic and intellectual assessments with well-standardized instruments and processes. However, such an undertaking was beyond the resources available to me. Given this limitation, it is reasonable to suggest that any bias that this shortcoming may have introduced is in the direction of a conservative interpretation of the results. For example, if diagnostic substitution occurred, it would most likely result in the inclusion of children with cognitive delays alone in the ASD group (false positives). In addition, it was more likely that the ASD group would include children with higher cognitive and adaptive ability. Either of these possibilities would reduce the differences obtained between the groups.

Convergent and Discriminant Validity of the SFA

A number of conclusions may be drawn from the correlations obtained between the SFA and the VABS-C. At the level of selected comparisons, significant positive

correlations of a moderate to moderately high level for both the composite scores and comparable sections of these tests suggest considerable convergence between the SFA and the VABS-C. As noted previously, the correlations were very similar to those that Hwang et al. (2002) reported for a combined group of children with learning disabilities (LDs) and cerebral palsy (CP). When taken together, both studies provide support for the convergent validity of the SFA with the VABS-C. The moderately high correlations obtained in the current study also indicate that, although both instruments measure aspects of similar traits, there is sufficient difference between the two to suggest that each instrument may provide a unique contribution to an understanding of the school functioning of individuals with ASD. However, this conclusion is necessarily tentative. Convincing evidence of convergent validity requires correlations from measurement processes that are maximally different (Foster & Cone, 1995). Because the VABS-C, the Maladaptive Domain of the VABS, and the SFA are teacher-completed rating scales, this requirement has not been fully met.

The discriminant validity of the SFA was not supported by the full pattern of correlations between the domains of the VABS-C and comparable sections of the SFA. Examination of the matrix of correlations indicated that the SFA failed to meet two out of three of Campbell and Fiske's (1959) criteria for a clear demonstration of discriminant validity. In addition, although the correlations between the Maladaptive Domain and the two main factors underlying the SFA (cognitive/behavioral and physical domains) were in the expected direction, the difference in the magnitude of these correlations was insufficient to provide a convincing demonstration of discriminant validity.

Based on the limited evidence of discriminant validity, it is necessary to ask whether the strength of relationship between the comparable sections of both instruments is attributable to factors other than the degree of convergence between the constructs or traits underlying the measures. For example, it has been understood for some time that the degree of relationship between scores on two measures can be inflated by similarity in the methods used (Campbell & Fiske, 1959). Because it was not possible to control for shared method variance or order effects through counterbalancing the order of completion of the instruments or by insuring a reasonable separation time between administrations of the measures, this is certainly a plausible explanation. However, the degree of similarity of the results of this study and those of Hwang et al. (2002), which involved a very different population and controls for order effects, support the interpretation of moderate convergence between measures. In addition, although there are similarities between school-related adaptive behavior and school functioning as operationalized in the VABS-C and the SFA, respectively, there are also significant differences in content, format, and scoring procedures. Therefore, it is unlikely that the degree of convergence observed between the two measures can be primarily attributed to irrelevant shared method variance.

Comparison of School Functioning

A comparison group was included in this study to determine whether the presence of ASD has a specific impact on the level of school functioning and the associated behaviors observed in the classroom. Identifying an appropriate comparison group for children with ASD is a well-documented and ongoing challenge (Jarrold & Brock, 2004). Difficulties in obtaining valid assessments and the pronounced irregularities in cognitive,

social, and linguistic profiles of children with ASD work against the possibility of identifying an equivalent comparison group. Because of this limitation, Burack, Iarocci, Flanagan, and Bowler (2004) argued that findings of group differences or the failure to find such differences may be closely tied to the specific circumstances of each study. Consequently, extrapolation from studies that involved planned comparisons between groups requires the collection of considerable convergent evidence. With this caution in mind, I have drawn a number of conclusions from the comparative component of this study.

First, the descriptive data collected over the course of this study suggest that the children with cognitive disabilities without ASD constituted a reasonable comparison group for those with ASD. Both groups of children were remarkably similar in terms of age, sex ratio, and the critical functional skill area that seems to be unaffected in autism. Furthermore, the children in the comparison group presented with a range of developmental disabilities. Given the purpose of the study, a heterogeneous group of children with various delays and disorders is preferred. Homogeneous comparison groups often have disability-specific characteristics of their own that could skew the results (Sigman et al., 1999). Second, a comparison of mean scores suggests that both groups also displayed similar levels of overall adaptive behavior, maladaptive behavior, and most aspects of school functioning. However, important differences began to emerge when the analysis was focused on specific traits and skill-performance areas. This pattern of broad similarities and specific differences is worth examining in some detail.

Adaptive behavior. Two of the results arising out of the comparison of the domains that constitute the VABS-C warrant discussion. First, it is the children with

cognitive delays without ASD who demonstrated a higher level of variability across the domains of the VABS-C rather than those with ASD. Second, even when other factors are held constant, children with ASD demonstrated a significantly lower level of school-related social skills. The former result is inconsistent with earlier studies that found that children with ASD demonstrated greater variability across the domains of the VABS than did children with mental retardation (Carter et al, 1998; Kraijer, 2000). However, in this study, daily living skills rather than IQ was used to establish the comparability of the groups, which thus ensured a greater similarity across the domains of adaptive behavior. The finding of lower socialization skills in the group of children with ASD is consistent with those of previous research and is the most frequently identified differential impairment in comparisons of adaptive behavior with children with other types of developmental disabilities (Rodrigue, Morgan, & Geffen, 1991). Significantly lower scores on the socialization domain of the VABS-C also suggest that the children in this group are representative of children with ASD.

Given the finding of lower levels of social skills in the ASD group, it is surprising that I did not find significantly higher mean teacher ratings of maladaptive behaviors in the ASD group. However, it is important to note that children with or without ASD who have poor social skills and limited communication are equally at risk for maladaptive behavior (National Research Council, 2001). In this study, children from the comparison group were placed in congregated special-education classes and may therefore represent a population at particular risk for maladaptive behavior. In addition, near-significant differences in comparisons involving nonparametric measures and visual inspection of the data suggest that the proportion of children with clinically significant maladaptive

behavior may have been higher in the ASD group. Finally, it is necessary to take into account the possibility that the Maladaptive Domain of the VABS may not be sensitive to the range of maladaptive behaviors that are particularly problematic in children with ASD. Accordingly, weak instrumentation and a conservative approach to significance may have masked a true difference in the level of maladaptive behaviors of the two groups.

School functioning. There were no differences between the two groups in school functioning in levels of participation, task supports, or physical-activity performance as measured by the SFA. The difference in cognitive/behavioral task performance approached the required significance level of .01. This, in combination with considerable research documentation of uneven patterns of cognitive-behavioral functioning (Green, Fein, Joy, & Waterhouse, 1995; Rapin, 1997), and the impact of a single outlier on the means of the ASD group, suggests that a more detailed analysis of the cognitive-behavioral difficulties is warranted.

The follow-up comparisons that I made across the nine subtests of the cognitive/ behavioral task scale produced statistically and clinically significant differences. These included differences at the .01 level on the Functional Communication and Safety subtests of the SFA. On a third subtest, Positive Interaction, I found a difference approaching significance. Finding significantly lower levels of functional communication on the SFA for those with ASD is not surprising given the diagnostic criteria for the disorder and is consistent with the findings of a substantial body of research (Tager-Flusberg, 2004).

The failure to find differences between the two groups on the communication domain of the VABS-C is best explained in terms of the differences in the range and types of behaviors sampled by the two measures. The communication domain of the VABS-C includes 75 items that cover the areas of receptive, expressive, and written communication. In contrast, the Functional Communication subtest of the SFA includes only 13 items that focus on primary expressive-language functions, including requesting, rejecting and relaying, and requesting information on functional school tasks.

It is possible that the SFA taps into a specific deficit and is focused on school-related functional communication tasks, demonstrated by children with ASD. There is certainly support in the literature for a disability-specific deficit in functional communication in ASD. It is known, for example, that pragmatic aspects of language relative to other children and other components of language are "specifically and universally impaired" (Tager-Flusberg, 2004, p. 76) in children with ASD. Further, children with ASD appear to communicate primarily to regulate the behaviors of others (instrumental language use) rather than for the purpose of sharing information or continuing a social exchange (Tager-Flusberg, 2000). In fact, this pattern of relative strength in the use of language for instrumental purposes compared to the use of language to comment or label appears to be a distinctive feature of ASD that is not noted in children with mental retardation (Wetherby, Prizant, & Schuler, 2000).

When one considers that only 4 of the 13 items in the functional communication subscale of the SFA could be considered instrumental (Appendix X), it is possible that the difference in scores reflects a real difference in the way that these two groups use language in a classroom setting. However, the VABS-C samples a broader range of

communicative behaviors, and hence is likely a more reliable measure. As a result, the possibility that the finding of a significant difference in the functional communication subtest of the SFA may be an artifact, a product of Type I error related to the use of repeated *t*-tests, cannot be ruled out.

The second finding from the subtest comparisons is perhaps the most significant. Relative to a comparable group of children without ASD, children with ASD demonstrated lower rates of appropriate responses to situations that are potentially unsafe. A plausible explanation may be found in the executive dysfunction theory of ASD. There is both clinical and experimental evidence of a relationship between executive functioning deficits and aspects of adaptive functioning in the daily lives of children with ASD (Ozonoff, 1995; Gilotty, Kenworthy, Sirian, Black, & Wagner, 2002). Thus, it is well established (Hill, 2004a, 2004b) that those with ASD are deficient in the executive functioning of inhibiting prepotent but incorrect responses. Conceptually, a relationship between this deficit and the failure to develop an appropriate sense of caution certainly seems possible. Such a deficit could result in a failure to override, at a conscious or unconscious level, well-established action schemas in relation to situational demands, even when greater risk is present.

An anecdote from a teacher of my acquaintance is illustrative. One of this teacher's students who had successfully learned and demonstrated the skills of stopping, waiting, and watching for traffic before crossing the road suddenly ran across a busy intersection when his mother unexpectedly appeared on the other side of the road. In this situation, neither specific instruction involving repeated practice nor the threat of

imminent danger was sufficient to inhibit the prepotent response of the child to rush to his mother at the end of the school day.

Apart from any theoretical implications, a replicable finding of an autism-specific deficit in safety-related behaviors has immediate practical significance. It would suggest that children with ASD are at greater risk for harm than are children with other types of developmental disabilities and with similar functional capacities. This conclusion would not come as a surprise to many caregivers and educators. Consequently, this finding may have important implications for resource allocation and intervention.

Social Validity

Foster and Cone (1995) suggested that establishing the validity of a measure involves two stages. The first, representational validity focuses on explorations of content, convergent, and discriminant validity. In this study I investigated the representational validity of the SFA by exploring the relationships between this measure and the VABS-C and the Maladaptive Domain of the VABS, as described in the preceding discussion. The second stage involves the investigation of elaborative validity. The key question related to this form of validity is whether the measure contributes something of value to an understanding of the phenomenon under consideration (Foster & Cone, 1995). Provided that the results of the comparative component of this study can be generalized and replicated, the unique information about the school functioning of children with ASD that the SFA provides is evidence of elaborative validity. However, because the utility of any measure depends on the extent to which that measure is valued and used, it is necessary to consider the results of the social validity of the SFA as well.

The results of the teacher interviews certainly suggest that teachers of children with ASD perceive the SFA as useful for identifying relevant aspects of school functioning and for contributing to the development of IPPs. In addition, a majority of teachers also perceived the SFA as more relevant to their students' needs than the VABS-C. The comments in the interviews suggest that teachers value the comprehensiveness of the SFA, its crediting of partial performance, and its measurement of necessary assistance and supports.

However, teacher support for the SFA was qualified. Completing all components of the SFA requires a considerable investment of teacher time. Two of the teachers reported that completing the SFA for one child involved almost a full day. If, as Myers et al. (1996) suggested, efficiency with respect to time is an important determinant of social validity, the amount of time required to complete the entire scale, at the very least, appears to diminish the social validity of the SFA. Some teachers were also concerned about a lack of sufficient items, particularly at the low end of the skill sequences, and a lack of a clear connection to the provincially mandated curriculum.

To summarize the results of this study, support for the validity and utility of the SFA with children with ASD is mixed. The SFA appears to have convergent validity with the broad content of the VABS-C, yet there is little evidence of discriminant validity. With reference to group comparisons, the cognitive/behavioral subscale of the SFA may be sensitive to the unique impact of ASD on important aspects of school functioning. Teachers perceived the SFA—in particular, the cognitive/behavioral components—as potentially useful in developing and evaluating educational interventions for children with disabilities, including ASD. Teacher support for the SFA is tempered by concerns

over the time required for completion, the adequacy of the instrument for children with very limited skills, and an insufficient link between the SFA and the general programs of study.

Limitations

This study should be viewed as preliminary. A number of procedural limitations affect the inferences that may be drawn from this study and are important considerations in evaluating its results. These limitations include the range, size, and heterogeneity of the sample; weaknesses associated with the instruments used during the study; and the failure to adequately control for method variance and biased responses.

Limitations of the Sample

The population against which this sample may be compared is elementary-aged children with ASD with significant developmental delays who attend congregated classes for children with disabilities. The extent to which these results can be generalized to higher functioning children with ASD or to children who attend regular education classes is uncertain. Recruitment and logistic challenges precluded the use of randomization. Furthermore, to ensure the comparability of groups, some preselection of classrooms was involved. Therefore, even within this delimited population, the sample should be considered one of convenience. It is possible, therefore, that the sample is insufficiently representative of students with ASD.

Because statistical precision is enhanced by a large sample size, the small number of participants in both groups adds another sample-based limitation to the study. Although the numbers of participants with ASD in this study is comparable to those in many other correlational and comparative studies with children with ASD (e.g., Boyd &

Corley, 2001; Harris et al., 1995; Scheinkopf & Siegel, 1998), a larger sample size would undoubtedly increase confidence in the findings. The unequal sample sizes and the heterogeneity of variance of the two groups precluded the use of multivariate techniques. This necessitated abandoning the discriminative validity component of the study. Furthermore, the comparative component of the study involved the use of multiple univariate procedures that increased the likelihood of Type 1 error. Paradoxically, the effort to control for Type 1 error through the use of a conservative alpha level may have hidden true differences between the groups.

Limitations Associated With the Instrumentation

Although I have examined the validity of the SFA, I did not examine its reliability. Adequate reliabilities have been reported for the SFA in the test manual (Coster et al., 1998) and in previous studies (Hwang et al., 2001); however, its reliability for the group included in the current study has not been established. This is a concern because, as Thompson, Diamond, McWilliam, Snyder, and Snyder (2005) pointed out, reliability co-efficients for a given measure can vary significantly for different groups being studied. This caution is especially warranted given the restricted range and small sample size that characterized the current study.

A second limitation associated with the measures employed in this study involves the use of the Maladaptive Domain of the Interview Edition of the VABS. As I mentioned earlier, I selected this instrument for its brevity and the similarity of its scoring to that of the VABS-C. An instrument that provided a broader sampling of behaviors that had been employed in other ASD-related research may have been more sensitive to the presence of maladaptive behavior in the ASD participants.

Control for Method Variance

The selected comparisons of correlations between the SFA and both the VABS-C and the Maladaptive Domain of the Interview Edition of the VABS provide support for the convergent validity of the SFA. However, scores obtained on a test are products not only of the construct being measured, but also of the method employed in the measurement process (Foster & Cone, 1995). Similarities in the methods used to measure different traits can "inflate" the relationship between the traits through "irrelevant method variance" (Campbell & Fiske, 1959, p. 84). In the current study I measured two traits, adaptive behavior and school functioning, through teacher-completed rating scales. The similarity of the measurement process likely introduced irrelevant method variance. Further, a number of the teachers filled out assessment packages for more than one child. Although the completion of assessments of children from each of the groups by the same teacher increases the reliability of comparisons across groups, the completion of multiple assessments by the same person during the correlational component increases shared method variance.

To rule out this source of systematic error, it would have been necessary to introduce a significantly different method of assessing adaptive behavior and insuring that each teacher completed only one assessment. Given the limited range of methods available for measuring adaptive behavior, the recruitment difficulties, and the already significant demand on teacher time, this option was not feasible. Campbell and Fiske (1959) suggested that if it is not possible to introduce independent methods, the investigator should obtain as much diversity as possible in terms of data sources. The measures themselves offered a possible source of diversity in this study. Even though the

SFA and the VABS both measure aspects of adaptive functioning through teacher ratings, they are very different instruments. The VABS-C is a norm-referenced measure of the achievement of specific school-related skills. In contrast, the SFA is a criterion-referenced measure that requires that the respondent rate the individual's level of participation, need for supports and adaptations, and ability to perform a wider range of skills using a scoring system that is quite different from that employed by the VABS.

Control for Response Bias

Given the investment of teacher time, it was necessary that I provide the teachers and school administrators with complete information on the purposes of the study. Despite my efforts to develop rapport and openness in responding, the information that they provided prior to assessment raises the possibility of biased responses in both the teacher ratings of the SFA and to the questions during the follow-up interviews.

Directions for Future Research

The results of this study suggest two general directions for future research. The first and most obvious is the need for replication of the results of the comparative components of the study. These results suggest some important differences in school functioning between children with ASD and cognitive delays and those with cognitive delays without ASD. However, as Burack et al. (2004) argued, it is important to consider that finding differences, or failing to find differences, may be the consequence of so many possible factors that a reasonable level of certainty will come only from convergent evidence. An example of convergent evidence might involve an investigation of the patterns of similarities and differences in school functioning in children with ASD who have measurable cognitive capacities in the average range or in children who have

received all of their educational experiences in typical classrooms. Also, because the subtests on which differences were obtained involve some degree of expressive communicative ability, a useful replication and elaboration of the current study could involve control for expressive language or communicative skills.

It might also be possible to provide convergent evidence by using substantially different measurement procedures. Advances in technology have permitted the development of increasingly precise and reliable observational measures of behaviors related to school functioning (Greenwood, Peterson, & Sideridis, 1995). Preliminary research has demonstrated that computer-assisted observational systems can reliably monitor these behaviors and identify the instructional and environmental conditions associated with increases in these behaviors in children with ASD (Kamps, Leonard, Dugan, Boland, & Greenwood, 1991). In addition to reducing some of the disadvantages of teacher report described in the Limitations section of this chapter, such observational systems might allow the investigator to account for instructional and environmental factors as possible variables in comparative studies.

The second future research direction could involve linking the theoretical and empirically based models of the core deficits of ASD to the functional impacts of these deficits. It has been argued that if a psychological process has been causatively linked to autism, there should be a proportional disruption in relevant aspects of adaptive functioning in real life (Volkmar et al., 2004). This argument suggests that a link between cognitive theories of core cognitive deficits of ASD and the day-to-day impacts of those deficits needs to be made explicit.

The findings of this study, for example, suggest that ASD affects the performance of classroom-based tasks associated with social interaction, pragmatic aspects of language, and self-regulation with regard to personal safety. As has been previously demonstrated, it is certainly possible to draw a link between these differences and cognitive theories of ASD; however, using theory would be more powerful in making predictions about the impacts on the child's ability to function in natural environments. Specifically, research might be directed at the implications of executive dysfunction on the child's ability to function in the classroom in terms of self-regulation, inhibition, and organizational strategies. Similarly, evolving knowledge of deficits in the development of theory of mind could be used to develop a more comprehensive and precise sampling of typical social interaction and language tasks that a child is likely to encounter in the classroom. This information would be valuable in determining the effects of previous intervention, directions for future educational efforts, and the child's support needs. In both of these examples ecologically-based assessment might provide a link between cognitive theories of core deficits, highly controlled laboratory studies and adaptive behavior in natural settings.

Conclusion

This study was motivated by the need to identify ecologically relevant outcome measures of educational programs for children with ASD for research, applied, and public-policy purposes. The findings from this study reveal mixed support for the use of the SFA as a valid measure of the school functioning of children with ASD relative to each of these purposes. Based on the information gathered on a group of elementary-aged children with ASD and significant cognitive disabilities, the SFA appears to demonstrate

a reasonable level of convergence with the broad content of the VABS-C, an extensively used and adequately standardized measure of school-related functional skills. The SFA also appears to be sensitive to a number of disability-specific and significant deficits in school functioning for this group of children. Further, teachers evaluated the SFA as identifying relevant school-related functional skills and needed supports. However, the results also suggest that the SFA also has some serious shortcomings as an outcome measure, including limited evidence of discriminative validity, possible inefficiency with respect to time, and uncertain reliability. Whether the shortcomings of the SFA outweigh its potential strengths depends on which of the three purposes is being considered.

Clearly, limited evidence of discriminative validity and uncertain reliability with this population indicate the need for caution in the use of the SFA as an outcome measure for research purposes. Strong evidence of validity and reliability are required to demonstrate control over sources of systematic error. In the absence of these properties, the results of even the most carefully designed studies may be open to question. However, given the limitations of the current study, further investigations of the validity and reliability with a larger and more diverse population of children with ASD are required before a definitive statement can be made about the research applications of the SFA.

In contrast, concern for very high levels of reliability and validity may be secondary to more pragmatic considerations in decisions related to policy and programming. In fact, these considerations may occasionally be at odds with traditional standards of scientific rigor (Simpson, 2003). Currently, the SFA is one of the few instruments that measures school-related functional skills, and it is unique in providing

information about the level of participation and supports that children with disabilities require in classroom settings. For this reason alone the SFA makes an important contribution to understanding the support and programming needs of children with ASD in classroom contexts. As noted, the SFA also provided important information about aspects of school functioning not addressed by the VABS-C. Furthermore, the results of the social validity component of this study demonstrate that teachers valued the information that the SFA provided related to the programming needs of this group of children with ASD, particularly in the area of cognitive-behavioral functioning. Accordingly, the SFA appears to have functional utility for programming purposes and, in combination with other forms of assessment, may help to inform policy decisions related to resource allocation.

The SFA is one example of an emerging approach to assessing the needs of individuals with significant disabilities, including ASD. Ecological models of assessment provide a potentially valuable theoretical framework for considering the effects of educational interventions. However, these models must reflect the particular needs and challenges of children with various disabilities. Concepts such as *participation*, *support*, and *functional skill* are too broad to be applied in an identical fashion across the great variety of children who fit under the umbrella of disability. For example, physical participation may have greater applicability to children who are socially engaged but physically challenged, whereas attentional and social engagement may be a more appropriate outcome for those with ASD for whom a lack of engagement is one of the primary defining characteristics of the disability. Similarly, the types of supports each of these children might require in a highly structured, low-enrollment special education

class will be quite different from what they require in a regular classroom. It is unlikely that a single instrument can capture the range of skills and diversity of support needs of children with various disabilities who are educated in the range of settings that is currently available.

As noted in the literature review, knowledge of ASD is expanding at an exponential rate. The expansion of this knowledge and its implications for children, families, and public institutions demand a parallel growth in theory and research related to the definition and measurement of outcomes. Ecological assessment models provide a new and needed perspective on assessment. However, to truly have value in advancing our understanding of the effects of educational intervention and the specific needs of children with ASD, these models and instruments must be shaped by the burgeoning empirical, theoretical, and social developments that seem to be a permanent feature of the field.

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APPENDIX A:

LETTER OF INTENT

Appendix A: Letter of Intent

School Functioning Study

Dear Parent,

My name is Tony McClellan. I am a PhD student at the University of Alberta. I have accumulated many years of experience working with students with disabilities as a teacher, consultant, administrator and psychologist throughout northern Alberta.

One of my research interests is the school adjustment of children with significant disabilities. I am particularly interested in the level and types of support that children with different disabilities require in the classroom. I am planning to conduct a study comparing the school adjustment of two groups of students: those with autism and developmental delays and students with developmental delays alone. The actual research involves a file review and the completion (by school staff) of two checklists. Students are not required to participate in any direct assessment activities.

The staff at your child's school has kindly agreed to work with me on this project. Before I undertake this study it is important to determine the approximate number of students that I can expect to include. If you are interested in finding out more about this study please check the box at the bottom and return the letter, or simply indicate your interest to your child's teacher. I will arrange to send out a detailed written description of the exact nature of the research along with information about how you can contact me.

Please be aware that signing this letter indicates that you would like additional information. I will approach your child's teacher only after you have read the information describing the study and/or have spoken to me and have signed a consent form.

Thank you for taking the time to read this letter. I hope you will consider permitting me to include information gathered on your child's school adjustment in this very important study. If so please let your child's teacher know that you would like more information as soon as possible.

Sincerely

Tony McClellan
BEd, MEd, C. Psych.

I, _____, am interested in finding out more about this study.

APPENDIX B:

FOLLOW-UP LETTER TO PARENTS

AND CONSENT FORM

Appendix B: Follow-Up Letter to Parents and Consent Form

School Functioning Study

Dear Parent,

Thank you for expressing interest in this research project. The following information provides an overview of the purposes and the activities involved in this study. There is a **Consent Form** attached to the end of this information. If you are willing to allow me to include your child in this study please sign the **Consent Form** and return it to your child's teacher. Information will not be collected on your child without a signed Consent Form. If the information provided is unclear or if you simply have more questions, please do not hesitate to contact me at .

Purpose of the School Functioning Study

This project has two primary goals. The first goal is to investigate the usefulness of a relatively new instrument, the School Function Assessment (SFA) with two groups of students, students with developmental delays and autism and students with developmental delays alone. This instrument provides information on the student's participation in school activities, his/her ability to carry out common school tasks and the level of support required by the student. The information provided by the SFA could be potentially very useful in planning programs for individual students. However, while the usefulness of the SFA has been studied with students with physical and learning disabilities it has not been validated with students with autism or students with general developmental delays.

The second goal of the study is to examine similarities and differences in the school adjustment of these two groups of students. Other studies have compared students with autism to students with developmental delays on characteristics such as IQ, social skills and adaptive behavior. However, to my knowledge no other study has attempted to compare the levels of support, adjustment and participation demonstrated by these two groups of students within a classroom environment. Such information has obvious value in determining the educational needs of these two groups in order to facilitate program planning.

Design of the Study

I have designed the project to be minimally disruptive to your child's program. The study will not involve direct assessment of your child. Instead, information will be gathered from two sources. Existing information assessment information will be gathered from your child's file. In addition, school personnel will be asked to complete two

questionnaires, the School Function Assessment and the Vineland Adaptive Behavior Scale.

All data collected will be pooled together and analyzed as group data. Every effort will be taken to insure the confidentiality of the information collected. Names will be removed and numbers will be used to identify questionnaires. This will insure that access to the results of individual questionnaires is limited to the researcher, parent and participating school personnel. It is also important to emphasize that information collected will not be used to evaluate the effectiveness or the appropriateness of your child's current educational program. The information gained from this project will be used in the preparation of my dissertation (thesis). If the results are significant they may be included in publications or presentations.

I hope that information gained from this research will provide direction towards improving school-based programs for students with disabilities. I plan to start collecting information from the programs as soon as the necessary consents are obtained. I look forward to receiving your permission to include your child in this project.

Once again thank you for showing interest in this study. If you would like your child to be included in this study please complete the consent form and return it to your child's teacher. As mentioned please do not hesitate to contact me if you would like additional information.

Tony McClellan

BEd, MEd, PhD (candidate), C. Psych.

School Functioning Study

Consent Form

Please sign section 1, 2, or 3

Section 1

I, _____, the parent/guardian of _____ (child's name), give the investigator, Tony McClellan permission to access assessment information including the results of standardized assessments and to collect information through a questionnaire format on my child's school adjustment from his/her teacher, teacher assistant or relevant school-based personnel.

Section 2

I, _____ wish to receive more information on this study.

Section 3

I, _____ do not wish to participate in this study. I also do not give the investigator permission to access information on my child.

Please note - Participation in this project is completely voluntary. You (and/or your child's teacher) have the right to withdraw at anytime without penalty

This study has been reviewed and approved by the Research Ethics Board of the Faculties of Education and Extension at the University of Alberta. For questions regarding participant's rights, and ethical conduct of research, contact the Chair of the Research Ethics Board at (780) 492-3751.

If you wish further information on the study please contact Tony McClellan at 422-6528 Concerns can also be directed to Dr. Jack Goldberg, Associate Professor, University of Alberta, at

Please fill out and return this form to your child's teacher.

APPENDIX C:

FOLLOW-UP LETTER TO TEACHERS

AND CONSENT FORM

Appendix C: Follow-Up Letter to Teachers and Consent Form

School Functioning Study

Dear Teacher,

As a teacher, administrator and psychologist I have been involved in developing and implementing programs for children with special needs for many years. I am currently completing a PhD in Special Education. One of my research interests is the school adjustment of children with significant disabilities and the level and types of support that children with different disabilities require in the classroom. I am planning to conduct research related to this very important topic. I am currently recruiting participants for the study described below.

This project has two primary goals. The first goal is to investigate the usefulness of a relatively new instrument, the School Function Assessment (SFA) with two groups of students, students with developmental delays and autism and students with developmental delays alone. This instrument provides information on the student's participation in school activities, his/her ability to carry out common school tasks and the level of support required by the student. The information provided by the SFA could be potentially very useful in planning programs for individual students. However, while the usefulness of the SFA has been established with students with other forms of disabilities, particularly with those with physical disabilities it has not been validated with students with autism or students with general developmental delays.

The second goal of the study is to examine similarities and differences in the school adjustment of these two groups of students. Other studies have compared students with autism to students with developmental delays on characteristics such as IQ, social skills and adaptive behavior. However, to my knowledge no other study has attempted to compare the levels of support, adjustment and participation demonstrated by these two groups of students within a classroom environment. Such information has obvious value determining the differences in the educational needs of these two groups in order to facilitate program planning.

I have designed the project to be as least disruptive to your program as possible. The study will not involve direct assessment of the students. Instead, information will be gathered from two sources. Existing assessment information will be gathered from the student's file. In addition you will be asked a few questions related to the student's program and to complete a series of questionnaires, the School Function Assessment (SFA), the Classroom Edition of the Vineland Adaptive Behavior Scale (VABS), a brief maladaptive behavior scale and a short evaluation of the SFA. The SFA requires approximately 1 ½ hours to complete while the VABS can be completed within ½ hour.

The other two questionnaires can be completed in a few minutes. Given this very significant investment of your time I will arrange with your principal to provide teacher coverage of your classroom while you complete these assessments.

Participation in this project is completely voluntary. You have the right to withdraw at anytime without penalty. All data collected will be put together and treated as a large group of participants. Every effort will be taken to insure the confidentiality of the information collected. Names will be removed and numbers will be used to identify questionnaires. This will insure that access to the results of individual questionnaires is limited to the researcher, parent and participating school personnel. It is also important to emphasize that information collected will not be used to evaluate the effectiveness or the appropriateness of the student's current educational program. The information gained from this project will be used in the preparation of my dissertation (thesis). If the results are significant they may be included in publications or presentations.

Thank you for taking the time to read this letter. If you are interested in participating in this study please complete the consent form and forward it to your principal. Should you have any questions I may be reached at 422-6528 or through e-mail at halmcc@shaw.ca. I would also be available to meet with you to provide more information about this research and to address any concerns. It is hoped that information gained from this research will provide direction towards improving school-based programs for students with disabilities. I look forward to working with you on this project.

Tony McClellan
BEd, MEd, PhD (candidate) C. Psych.

School Functioning Study

Teacher Consent Form

Please complete section 1, 2 or 3

Section 1

I_____ wish to participate in this project. I understand that participation is voluntary and that I can with draw at anytime.

Section 2

I, _____ wish to receive more information on this study before making a decision on further participation.

Section 3

I, _____ do not wish to participate in this study.

This study has been reviewed and approved by the Research Ethics Board of the Faculties of Education and Extension at the University of Alberta. For questions regarding participant's rights, and ethical conduct of research, contact the Chair of the Research Ethics Board at (780) 492-3751.

If you wish further information on the study please contact Tony McClellan at 422-6528 Concerns can also be directed to Dr. Jack Goldberg, Associate Professor, University of Alberta, at

Sincerely,

Tony McClellan, C Psych. PhD (candidate)

APPENDIX D:

INSTRUCTIONS FOR COMPLETING QUESTIONNAIRES

Appendix D: Instructions for Completing Questionnaires

Thank you for participating in this study.

I sincerely appreciate the commitment of time involved in completing these questionnaires. I've provided some basic instructions. Although the completion of these measures should be straightforward, questions might arise. Should you have any questions, please do not hesitate to contact me. Although I am often away from my office I check my e-mail everyday. My e-mail address is If you would like to talk to me directly call 422-6528. Alternatively, you can call my administrative support, Pat Fahner @ 422-6545 (She is very good at tracking me down).

- A complete set of assessments for each student includes the following:
  School Function Assessment (SFA)
  Teacher Feedback Rating Form for the SFA (1 page)
  Vineland Adaptive Behavior Scale (VABS)
  Maladaptive Behavior Domain (1 page)

- Each classroom will also have a copy of the **Rating Scale Guide** for the SFA. You will need this to complete the SFA.

- Put the student's name on the **label** at the top of the VABS and the SFA. Put your name on the other label.

- Use questionnaires with the same number for each individual student.

- It is unnecessary to complete any information on the front of the VABS other than the date of administration.

- Read the **Rating Guide** for the SFA before you start and keep the **Guide** open as you complete the form.

- Please complete each section of SFA and the VABS. The SFA was designed for all children with disabilities; consequently it may seem that some sections are obviously inappropriate. However, for the sake of consistency it is important to complete all sections (except those in Grey)

- Many of the sections of the two instruments (the SFA and the VABS) overlap. This is intentional.

- It is unnecessary to complete the **Comments** section of either questionnaire unless it is absolutely critical to understand the assigned rating.

Some points to keep in mind when completing the SFA:

- Parts I, II, & III focus on different aspects of functioning and utilize **different rating criteria.** Part II asks you to rate both the assistance the child might require and the adaptations provided.
- You should assign a rating on what you believe is typical or consistent performance for that student.
- Ratings compare the student to typically developing peers of the same age.
- Each item must be rated in order to calculate the results accurately. Do not leave any items blank. ***Remember, the rating represents your best judgement it does not require 100% certainty!!!***
- As you complete the SFA please think about how appropriate you feel each section of the SFA is for this particular student? (the Teacher Feedback Form included with the SFA asks you to rate each section for appropriateness. You can complete this checklist as you complete each section, or after you complete the entire SFA)

APPENDIX E:

ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS WITH ASD

Appendix E: Assessment Information Available on Participants with ASD

Participant	IQ	Adaptive behavior	Other assessments
1	Not on file	VABS < 1%ile	Not on file
2	47	36	Not on file
3	Not on file	Not on file	Not on file
4	36	VABS < 1%ile	PLS III < 1%ile
5	Not on file	Not on file	Not on file
6	Not on file	ABS Part-I < .4 % %tile Part II 37%	Not on file
8	Not on file	Not on file	CELF-P
22	Not on file	Not on file	N/A
24	SBFE 57-74	VABS areas scores 33–49	N/A
25	Not on file	Normative Adaptive Checklist < 1%ile	N/A
29	75	VABS Composite 3 yrs – 8 months (C.A. 5 yrs. 5 months)	PLS III <1%ile
30	Cognitive assessment attempted but discontinued	VABS composite (C.A. 6 yrs.-4 months)	PLS IV < 1%ile
32	Not on file	Not on file	REEL Standard Score 76 PDMS II < 1%ile
33	Not on file	Not on file	N/A
34	Not on file	Not on file	N/A
35	BSID –"overall severely delayed"	VABS Adaptive Behavior < ½ chronological age	PLS III < 1%ile PDMS II < 1%ile
37	SBFE <36-70 "moderate delay"	VABS area scores 52-64	[f]PDMS II < 3%ile
36	Cognitive assessment attempted but discontinued	Not on file	Not on file
38	39	SIB-R -< ½ chronological age	Not on file
40	Not on file	Not on file	Not on file
42	Not on file	75	CELF-P = 1%ile
44	Not on file	54	Pre-verbal
45	42	65	Not on file

Note. PLS = Preschool Language Scale; CELF-P Clinical Evaluation of Language Functions–Preschool; SBFE = Stanford Binet Intelligence Scales IV Edition; REEL = Receptive-Expressive Emergent Language Test; BSID = Bayley Scales of Infant Development; PDMS = Peabody Developmental Motor Scales; Scales of Independent Behavior-Revised.

APPENDIX F:

SUPPORTS AND SERVICES QUESTIONNAIRE

Appendix F: Supports and Services Questionnaire

File #_____

Date: _____

Child Info

Date of Birth: ____/____/____

Sex: Male: ____ Female: _____

Diagnosis:

1. Primary Diagnosis:_____
2. Secondary Diagnosis_____

- If the diagnosis is within Autism Spectrum Disorder please indicate:
  - ❑ Autistic Disorder
  - ❑ Atypical Autism
  - ❑ Asperger's Disorder
  - ❑ PDD:NOS
  - ❑ Other _____
  - ❑ Diagnosis made by:
    - ❑ Multi-disciplinary team
    - ❑ Psychiatrist
    - ❑ Chartered Psychologist
    - ❑ Pediatrician
    - ❑ Family Doctor
    - ❑ Other _____

- Instruments used in the diagnosis
  - ❑ DSM-IV
  - ❑ ICD-10
  - ❑ ADOS
  - ❑ CARS
  - ❑ ABC
  - ❑ Other _____

Additional Health Information

- ❑ Additional diagnosis (e.g. Fragile X, FASD, Epilepsy, etc.)

  _____

  _____

- ❑ Medication (please list)

  _____

3. Assessment Information:

- IQ

  Date administered___/___/___

Stanford-Binet: Fourth Edition	Wechsler Scales (WISC, WIPPSI, ETC)	Other (name of test)
VR_____	VIQ_____	Verbal _____
A/VR_____	PIQ_____	Visual_____
QR_____	FS_____	Other_____
STM_____		Total_____
Composite score_____		

- Vineland Adaptive Behavior Scale

  Date administered___/___/___

  Communication _____
  Daily Living Skills_____
  Socialization_____
  Motor Skills_____
  Maladaptive Behavior_____
  Adaptive Score _____

- AAMD scale

  Date administered___/___/___

  Adaptive Behavior Score_____
  Maladaptive Behavior Score_____

- Language

  Date administered___/___/___

  Name of Test_____

  Receptive language_____
  Expressive language_____
  Total Language_____

Level of Services Provided

1. **Teacher Assistant Support**

   - **Ratio** of adults (Teacher/Teacher Assistants/other paid employees) to Students (check the appropriate box)

- ☐ 1 to 1
- ☐ 1 to 2
- ☐ 1 to 3
- ☐ 1 to 4
- ☐ 1 to 5
- ☐ Other _____

   - **Level** of Teacher Assistant Support

- ☐ Level 1- Receives little if any 1:1 assistance (responds to group intervention)

- ☐ Level 2- Receives some 1:1 assistance primarily with tasks and activities related to the student's specific area of difficulty

- ☐ Level 3- Receives assistance to accomplish most tasks or activities or for behavioral regulation (follows some routines with minimal prompting or assistance)

- ☐ Level 4 – Receives almost constant 1:1 assistance to insure task completion and/or for behavioral regulation

2. **Support for Speech and Language**

   - **Format**

- ☐ Direct intervention by a speech and language pathologist
- ☐ Consultative support from a speech and language pathologist

   - **Level**

- ☐ Level 1- 1 to 3 visits a year

- ☐ Level 2- 3 to 5 visits per year

- ☐ Level 3- 5 to 10 visits per year

- ☐ Level 4 – More than 10 visits per year

3. Support for Motor and/or Sensory Functioning

- **Format**

- ❑ Direct intervention by a occupational therapist
- ❑ Direct intervention by a physical therapist
- ❑ Consultative support from an occupational therapist
- ❑ Consultative support from an physical therapist

- **Level** of occupational therapy support

- ❑ Level 1- 1 to 3 visits a year
- ❑ Level 2- 3 to 5 visits per year
- ❑ Level 3- 5 to 10 visits per year
- ❑ Level 4 – More than 10 visits per year

4. Behavioral Support

- **Format**

- ❑ Direct intervention by psychologist
- ❑ Direct intervention by education/behavior consultant
- ❑ Consultative support from psychologist
- ❑ Direct intervention by education/behavior consultant

- **Level**

- ❑ Level 1- 1 to 3 visits a year
- ❑ Level 2- 3 to 5 visits per year
- ❑ Level 3- 5 to 10 visits per year
- ❑ Level 4 – More than 10 visits per year

APPENDIX G:

TEACHER FEEDBACK RATING OF THE SCHOOL FUNCTIONING ASSESSMENT

Appendix G: Teacher Feedback Rating of the School Functioning Assessment

Student #_____

The SFA is a relatively new instrument and one of the only instruments that purports to measure school functioning in children with disabilities. As a new instrument the SFA has not been studied extensively, particularly with children with specific types of disabilities. Completion of the SFA requires a considerable investment of time. For these reasons it is important to determine the usefulness of this instrument. You are therefore requested to complete this simple checklist rating the appropriateness of each section for the child being assessed. Appropriateness is defined as whether the section rates an important aspect of the student's functioning and provides information that could be considered in developing the student's Individual Program Plan (IPP).

Please circle the descriptor that most aptly describes the appropriateness of each of these areas.

Area	Not Appropriate (N/A)	Somewhat Appropriate (S/A)	Appropriate (A)	Very Appropriate (V/A)
Part I Participation	N/A	S/A	A	V/A
Part II Task Supports				
❑ Physical Tasks – Assistance	N/A	S/A	A	V/A
❑ Physical Tasks – Adaptations	N/A	S/A	A	V/A
❑ Cognitive/Behavioral – Assistance	N/A	S/A	A	V/A
❑ Cognitive/Behavioral – Adaptations	N/A	S/A	A	V/A
Part III Activity Performance				
❑ Physical Tasks	N/A	S/A	A	V/A
❑ Cognitive/Behavioral Tasks	N/A	S/A	A	V/A

APPENDIX H:

DIAGNOSTIC INFORMATION ON PARTICIPANTS WITH ASD

Appendix H: Diagnostic Information on Participants with ASD

	Demographics			Diagnostic information		
Participant	Gender	Age (years)	ASD diagnosis	Additional diagnosis	Diagnostic process	Reference to ASD rating scales
1	Male	7.42	ASD	Severely delayed mental development	1	No
2	Male	6.5	Autism	Query tics	1	Yes
3	Male	6.0	Autism	N/A	1	No
4	Male	7.25	Autism	Query Soto syndrome	1	No
5	Male	6.5	Autism	N/A	1	No
6	Male	8.42	Autism	N/A	1	No
8	Male	9.42	Autism	Developmental delay, severe communication disorder	1	No
22	Female	11.33	PDD	N/A	4	Yes
24	Female	11.25	PDD	N/A	2	No
25	Male	8.92	PDD	N/A	1	No
29	Male	7.75	ASD	N/A	1	Yes
30	Female	7.25	AD	N/A	1	Yes
31	Male	9.08	ASD	N/A	1	Yes
32	Male	7.33	AD	Severe cognitive delay, possible ADHD	1	No
33	Male	10.75	Autism	N/A	1	No
34	Male	8.42	Autism	Severe cognitive and motor delays	1	
35	Female	8.92	Autism	N/A	1	Yes
36	Male	8.83	AD	Severe communication disorder, severe fine motor delays	1	No
37	Male	7.92	Autism	N/A	2	Yes

(table continues)

	Demographics			Diagnostic information		
Participant	Gender	Age (years)	ASD diagnosis	Additional diagnosis	Diagnostic process	Reference to ASD rating scales
38	Female	10.42	AD	Moderate developmental delays	1	Yes
40	Male	10.83	Autism	Linear Nevus syndrome	2	No
42	Male	6.12	ASD	Severe language disorder	3	No
44	Female	8.5	Autism	Severe communication, motor and cognitive delays	3	No
45	Male	7.42	ASD	Severe communication disorder	1	No

Note. The processes and agents used in establishing a diagnosis are codes as follows: 1 = multidisciplinary team, 2 = pediatrician alone, 3 = diagnosis was established by a psychiatrist alone, 4 = diagnosis was made by a chartered psychologist alone. PDD = pervasive developmental disorder, AD = autistic disorder.

APPENDIX I:

ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS WITH ASD

Appendix I: Assessment Information Available on Participants With ASD

Participant	IQ	Adaptive behavior	Other assessments
1	Not on file	VABS < 1%ile	Not on file
2	47	36	Not on file
3	Not on file	Not on file	Not on file
4	36	VABS < 1%ile	[a]PLS III < 1%ile
5	Not on file	Not on file	Not on file
6	Not on file	ABS Part-I < .4 % %tile Part II 37%	Not on file
8	Not on file	Not on file	[b]CELF-P
22	Not on file	Not on file	N/A
24	[c]SBFE 57-74	VABS areas scores 33–49	N/A
25	Not on file	Normative Adaptive Checklist < 1%ile	N/A
29	75	VABS Composite 3 yrs – 8 months (C.A. 5 yrs. 5 months)	PLS III <1%ile
30	Cognitive assessment attempted but discontinued	VABS composite (C.A. 6 yrs.-4 months)	PLS IV < 1%ile
32	Not on file	Not on file	[d]REEL Standard Score 76 PDMS II < 1%ile
33	Not on file	Not on file	N/A
34	Not on file	Not on file	N/A
35	[e]BSID –"overall severely delayed"	VABS Adaptive Behavior < ½ chronological age	PLS III < 1%ile PDMS II < 1%ile
37	SBFE <36-70 "moderate delay"	VABS area scores 52-64	[f]PDMS II < 3%ile

(table continues)

Participant	IQ	Adaptive behavior	Other assessments
36	Cognitive assessment attempted but discontinued	Not on file	Not on file
38	39	[g] SIB-R -< ½ chronological age	Not on file
40	Not on file	Not on file	Not on file
42	Not on file	75	CELF-P = 1%ile
44	Not on file	54	Pre-verbal
45	42	65	Not on file

Note. [a]PLS = Preschool Language Scale; [b]CELF-P Clinical Evaluation of Language Functions–Preschool; [c]SBFE = Stanford Binet Intelligence Scales IV Edition; [d]REEL = Receptive-Expressive Emergent Language Test; [e]BSID = Bayley Scales of Infant Development; [f]PDMS = Peabody Developmental Motor Scales; [g]Scales of Independent Behavior-Revised.

APPENDIX J:

DIAGNOSTIC INFORMATION ON PARTICIPANTS WITH COGNITIVE DELAYS WITHOUT ASD

Appendix J: Diagnostic Information on Participants With Cognitive Delays without ASD

	Demographics		Diagnostic information	
Participant	Gender	Age(years)	Diagnosis	Additional diagnosis
7	Male		Global developmental delay	N/A
9	Female	10.11	Kabuki syndrome	Multiple congenital anomalies
10	Female	8.58	Down syndrome	N/A
11	Female	9.08	Chromosomal abnormality	Acute renal failure
12	Male	8.58	Down syndrome	N/A
13	Male	9.92	Cornelia De Lange syndrome	N/A
15	Male	12.67	Microcephaly	Severe mental disability
	Male	12.58	Down syndrome	N/A
41	Male	6.42	Severe communication delays	Delays across all areas
46	Male	8.08	Mild mental disability	N/A
47	Female	7.50	Mild mental disability	N/A
48	Male	7.75	Mild mental disability	N/A
49	Male	7.75	Moderate mental disability	N/A
50	Female	9.50	Rubinstein-Taybi syndrome	N/A
51	Male	9.92	Down syndrome	N/A

APPENDIX K:

ASSESSMENT INFORMATION AVAILABLE ON PARTICIPANTS

WITH COGNITIVE DELAYS WITHOUT ASD

Appendix K: Assessment Information Available on Participants With Cognitive Delays Without ASD

Participant	IQ	Adaptive behavior	Other assessments
7	68	Not on file	N/A
9	[a]SBFE (partial) "mild-moderate" delays	Not on file	N/A
10	Not on File	[b]ABS <1%ile	N/A
11	SBFE (partial) "moderate" delays	[c]VABS scores "below first percentile in all areas"	[d]PDMS < 1%ile
12	Not on file	Not on file	[e]PLS < 1%ile [f]PDFMS < 1%ile
13	Not on file	Not on file	N/A
15	Assessment attempted but discontinued	ABS < 1%ile	N/A
23	Not on file	Dated assessment indicates adaptive functioning at ½ chronological age	N/A
41	Not on file	Not on file	N/A
46	67	Not on file	N/A
47	67	Not on file	PLS < 1%ile PDFMS = 21%ile
48	66	VABS <1%ile	PLS = 8%ile
49	48	[g]SIB-R < 1%ile	N/A
50	47	VABS 63	N/A
51	Not on file	Not on file	PLS < 1%ile

Note. [a]Stanford Binet Intelligence Scale: Fourth Edition; [b]Adaptive Behavior Scale; [c]Vineland Adaptive Behavior Scale; [d]Peabody Developmental Motor Scale; [e]Preschool Language Scale; [f]Peabody Developmental Fine Motor Scale; [g]Scales of Independent Behavior-Revised.

APPENDIX L:

DESCRIPTIVE STATISTICS FOR THE SFA

FOR CHILDREN WITH ASD

Appendix L: Descriptive Statistics for the SFA for Children with ASD

	Mean	SD	Range	Criterion cut-off
Part I: Participation				
Participation	53.46	23.28	0-100	100
Part II Task Supports				
Physical Tasks-Assistance	57.54	24.05	0-100	100
Physical Tasks-Adaptations	71.71	20.01	37-100	100
Cognitive/Behavioral Tasks-Assistance	33.25	23.69	0-83	77
Cognitive/Behavioral Tasks-Adaptations	36.71	29.71	0-100	91
Part III Activity Performance: Physical Tasks				
Travel	72.29	14.21	43-100	100
Maintaining and Changing Positions	71.71	20.01	49-100	100
Recreational Movement	58.01	19.61	38-100	83
Manipulation with Movement	66.83	15.09	43-100	93
Using Material	60.08	21.87	21-100	83
Setup and Cleanup	66.38	18.56	35-100	87
Eating and Drinking	69.25	23.25	42-100	100
Hygiene	60.21	23.25	22-100	92
Clothing Management	69.83	20.46	37-100	93
Cognitive Behavioral Tasks				
Functional Communication	36.83	20.33	7-91	91
Memory and Understanding	51.00	21.58	20-100	79
Following Social Conventions	35.75	21.58	7-77	73
Compliance with Adult Directives and School Rules	46.58	18.68	7-86	76
Task Behavior/Completion	38.5	19.91	6-88	72
Positive Interaction	37.25	21.08	0-81	81
Behavior Regulation	38.29	18.14	0-77	74
Personal Care Awareness	45.67	23.92	0-100	92
Safety	33.08	23.22	0-81	91

APPENDIX M:

DESCRIPTIVE STATISTICS FOR THE SFA FOR CHILDREN WITH COGNITIVE DELAYS

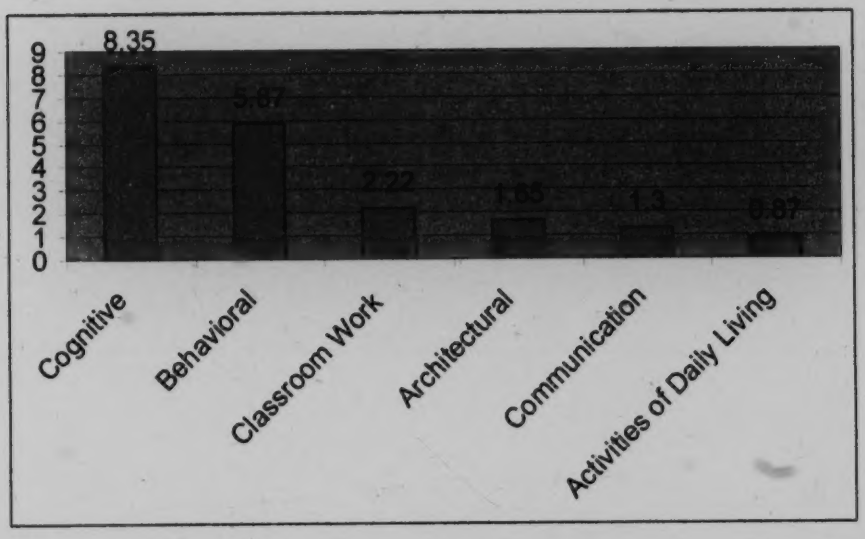
Appendix N: Descriptive Statistics for the SFA for Children with Cognitive Delays

	Mean	SD	Range	Criterion cut-off
Part I Participation				
Participation	56.20	11.23	34-74	100
Part II Task Supports				
Physical Tasks-Assistance	56.07	12.38	35-78	100
Physical Tasks-Adaptations	61.80	15.44	37-100	100
Cognitive/Behavioral Tasks-Assistance	39.53	13.34	0-58	77
Cognitive/Behavioral Tasks-Adaptations	42.20	15.29	0-16	91
Part III Activity Performance: Physical Tasks				
Travel	72.67	9.58	37-86	100
Maintaining and Changing Positions	76.13	13.90	60-100	100
Recreational Movement	55.67	12.34	38-92	83
Manipulation with Movement	64.93	11.34	46-82	93
Using Material	54.93	10.72	35-71	83
Setup and Cleanup	67.26	14.71	42-94	87
Eating and Drinking	69.46	14.29	52-100	100
Hygiene	62.40	13.60	49.92	92
Clothing Management	66.53	8.95	52-77	93
Cognitive Behavioral Tasks				
Functional Communication	49.33	16.76	14-81	91
Memory and Understanding	53.66	9.92	30-67	79
Following Social Conventions	45.47	12.33	27-64	73
Compliance with Adult Directives and School Rules	52.53	11.90	29-82	76
Task Behavior/Completion	42.07	9.94	18-55	72
Positive Interaction	48.12	12.76	21-62	81
Behavior Regulation	44.53	11.03	26-65	74
Personal Care Awareness	56.00	16.85	37-100	92
Safety	47.23	16.39	29-81	91

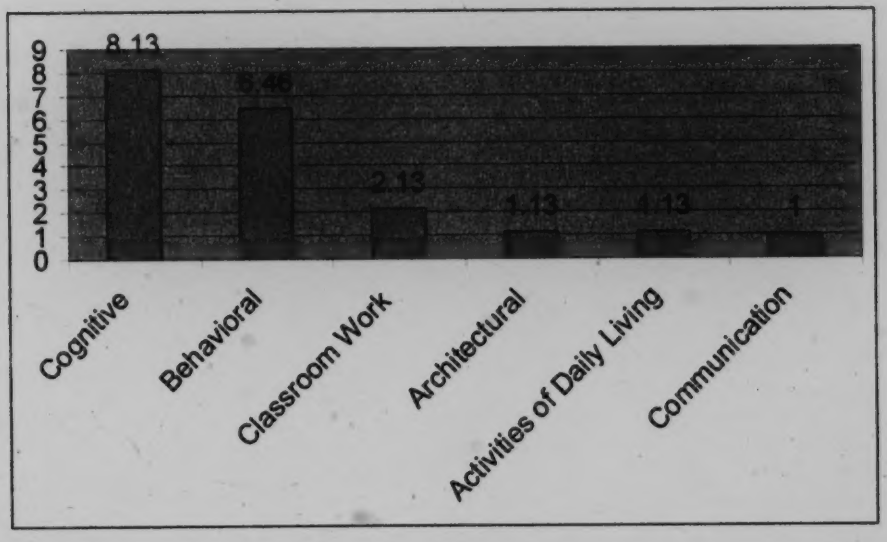
APPENDIX N:

MEAN NUMBER OF ADAPTATIONS FOR EACH OF THE GROUPS AND LIST OF ADAPTATIONS FROM THE ADAPTATIONS CHECKLIST OF THE SCHOOL FUNCTION CHECKLIST

Appendix N: Mean Number of Adaptations for Each Group



Mean number of adaptations provided to children with ASD



Mean number of adaptations provided to children with cognitive delays without ASD.

Adaptations that the student routinely uses to perform functional activities during the school day from the School Function Assessment

Activities of Daily Living		
bib	modified/specialized food	diaper
custom dishes/utensil	tube feeding	modified clothing
special cup	catheterization	dressing aides
straw	toileting schedule	other
Architectural		
set-aside personal space	signs and markers	adapted bathroom facilities
modified classroom arrangement	elevator	adapted playground equipment
modified community areas	stair climber	other
hallway modifications	ramps	
Behavioral		
formal behavioral management	rule modification	use of reinforcers
specialized routines/responsibilities	special placement in line	special seating placement
modified community areas	increased feedback or monitoring	transition modifications
different student grouping arrangements	extended time for activities	other
Classroom Work		
adapted writing tools	adapted scissors	other
magnifiers	manipulative materials	
adapted work surfaces	book/paper holder	
modified writing paper	adapted toys	
Cognitive		
alternative curriculum	alternative/modified directions	use of notebooks or lists
alternative/modified materials	multisensory approach	peer involvement
adjusted expectations/objectives	change in pace or sequence of activities	other
additional repetition or practice	extended time	

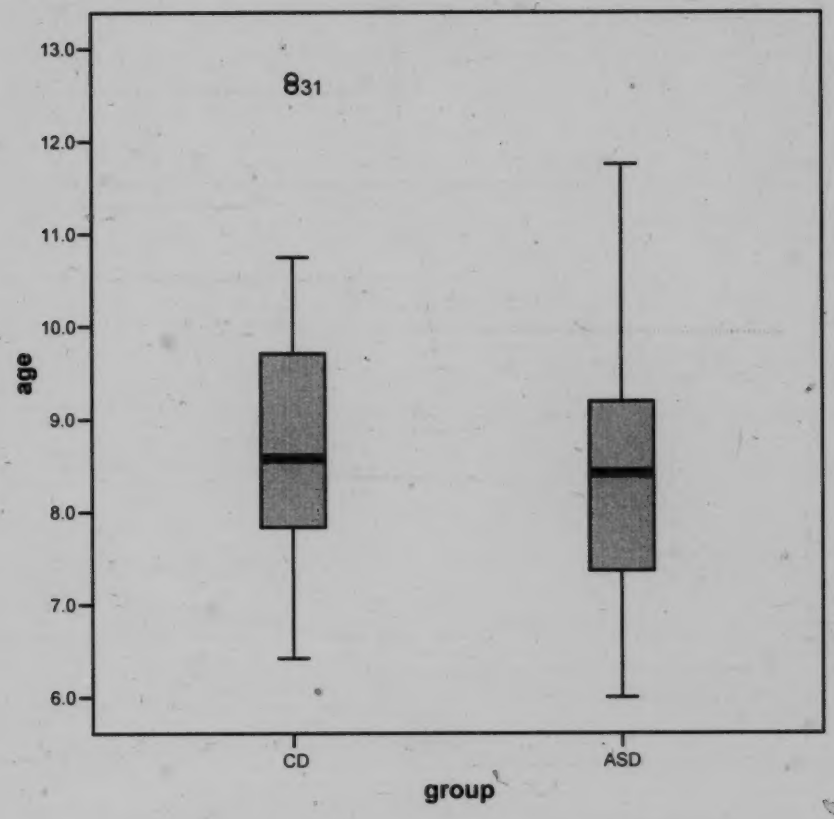
Communication

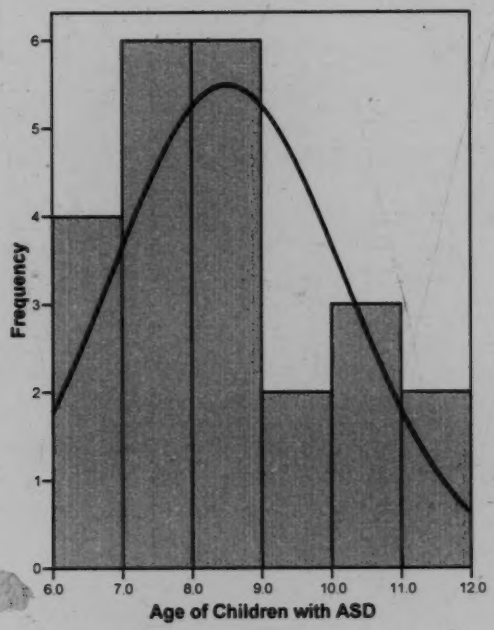
signal system
communication board
communication book
speech output device
mouthstick
headband
choice program
hearing aids
microphone
interpreter
Braille
other

APPENDIX O:

BOX PLOT AND HISTOGRAM: AGE

Appendix O: Box Plot: Age

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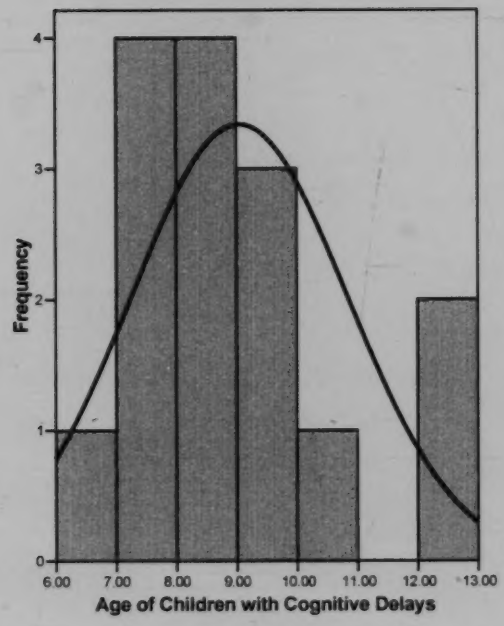
10.0
11.0
12.0
Age of Children with ASD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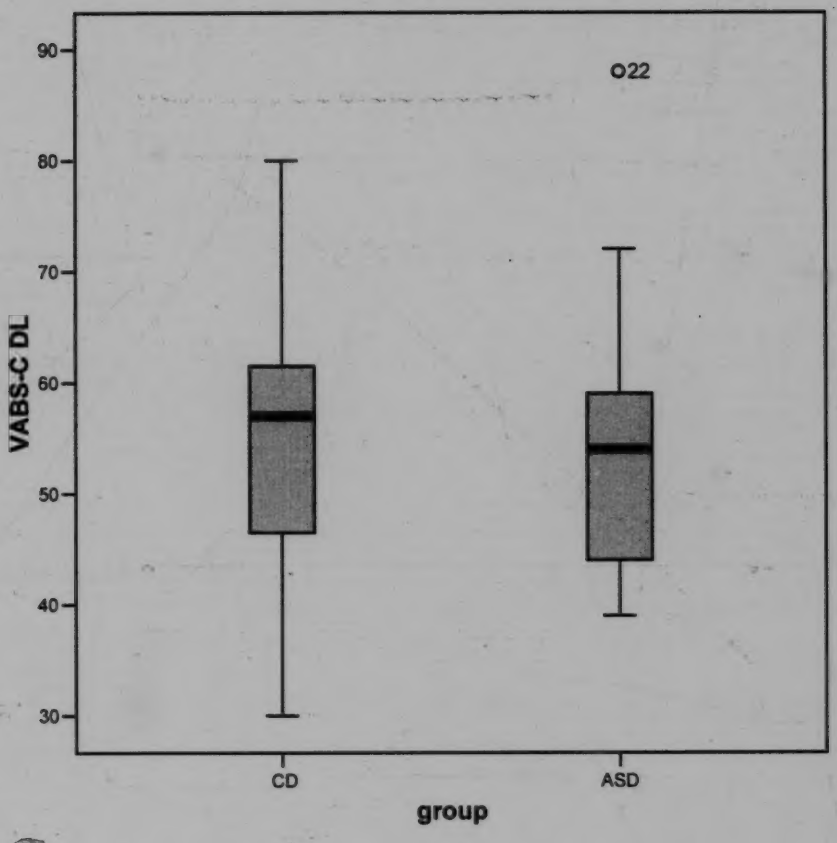
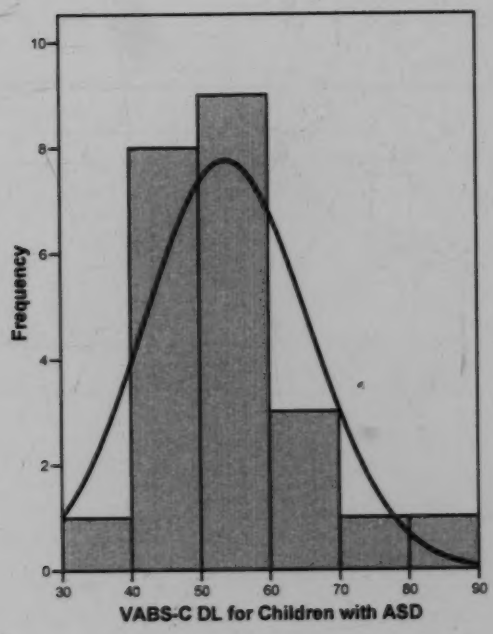
8.00
9.00
10.00
11.00
12.00
13.00
Age of Children with Cognitive Delays

APPENDIX P:

BOX PLOT AND HISTOGRAM: VABS-C DL

Appendix P: Box Plot: VABS-C DL

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60
70
80
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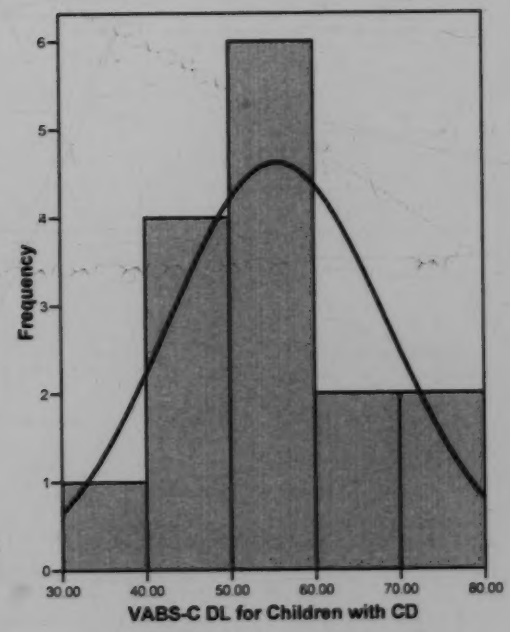
VABS-C DL for Children with ASD


Frequency
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40.00
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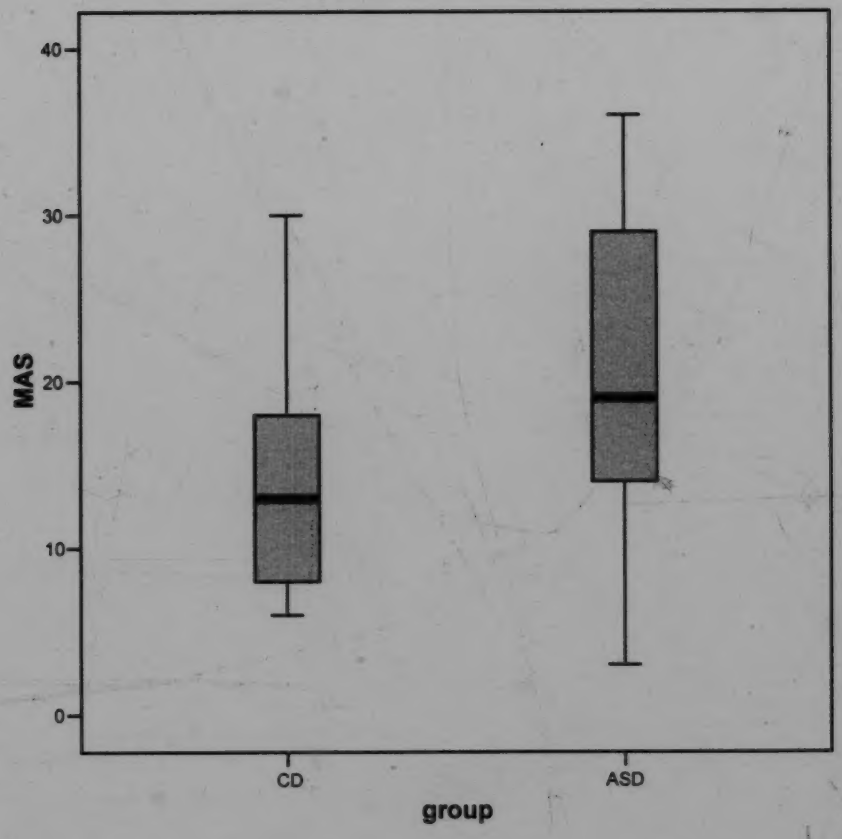
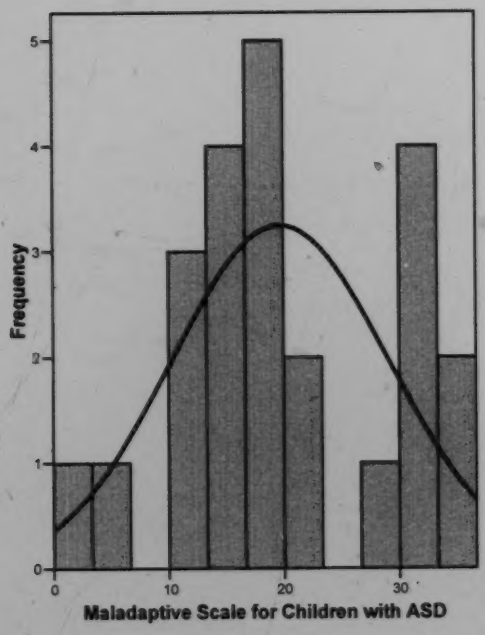
70.00
80.00
VABS-C DL for Children with CD

APPENDIX Q:

BOX PLOT AND HISTOGRAM: MAS

Appendix Q: Box Plot: MAS

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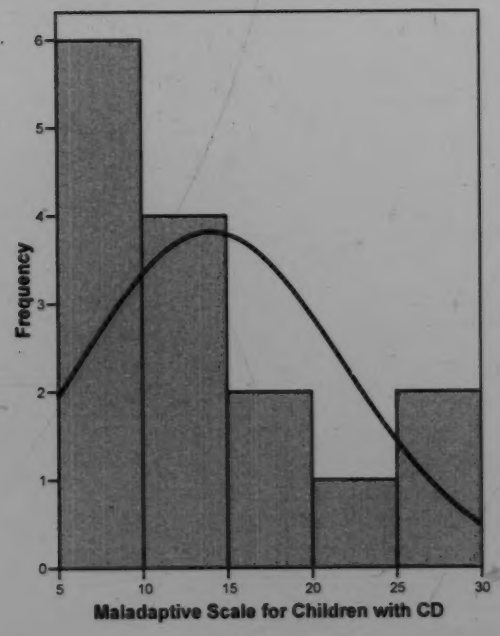
Maladaptive Scale for Children with ASD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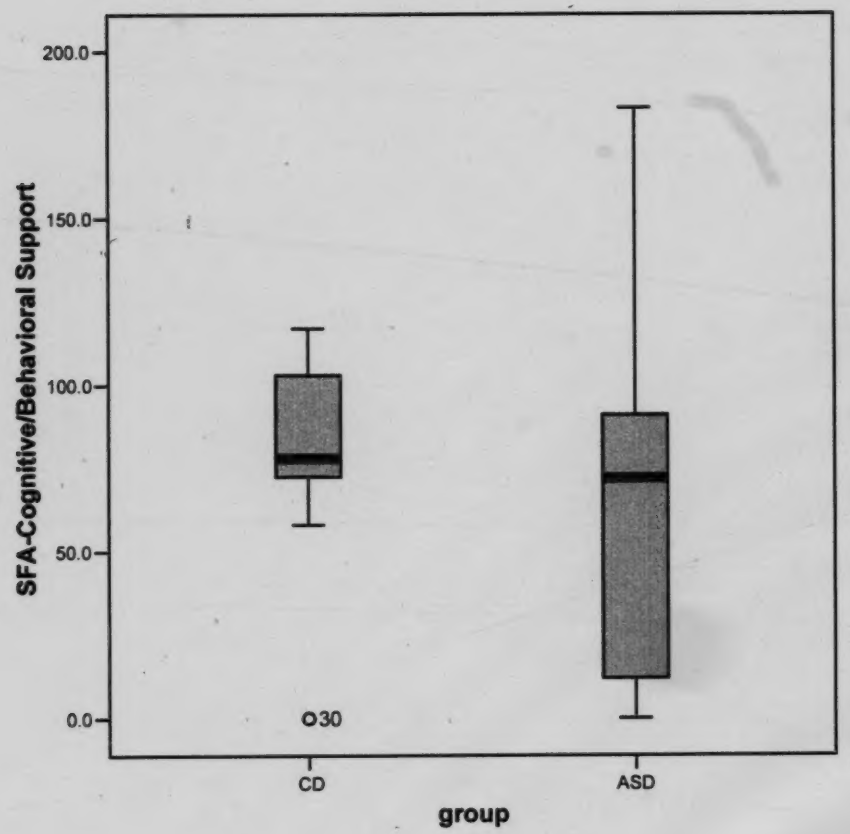
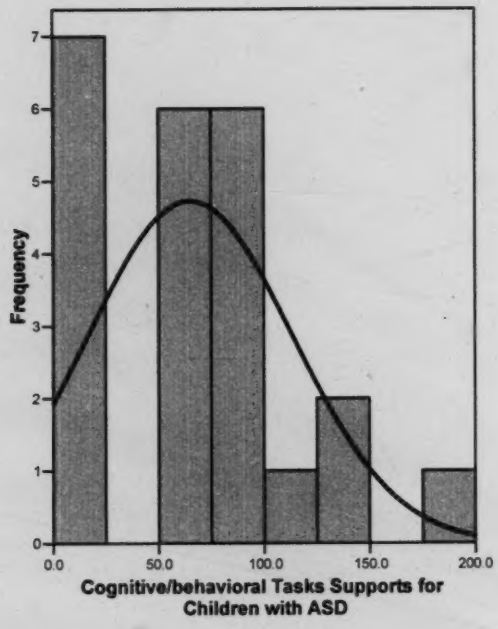
15
20
25
30
Maladaptive Scale for Children with CD

APPENDIX R:

BOX PLOT AND HISTOGRAM: COGNITIVE/BEHAVIORAL TASK SUPPORTS

Appendix R: Box Plot and Histogram: Cognitive/Behavioral Task Supports

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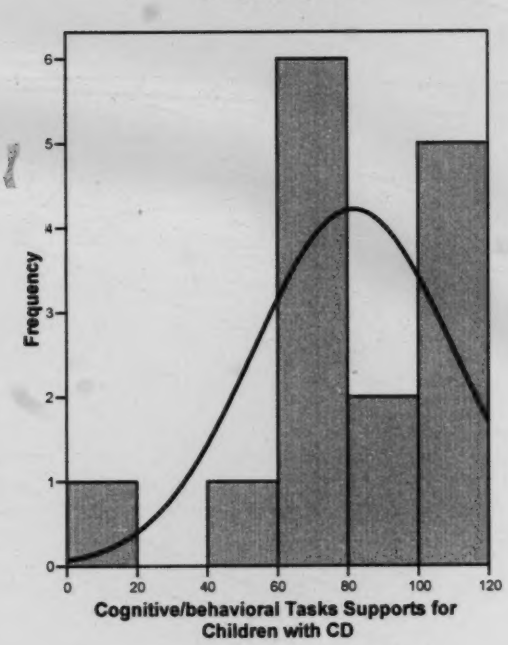
200.0
Cognitive/behavioral Tasks Supports for Children with ASD


Frequency
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5
6
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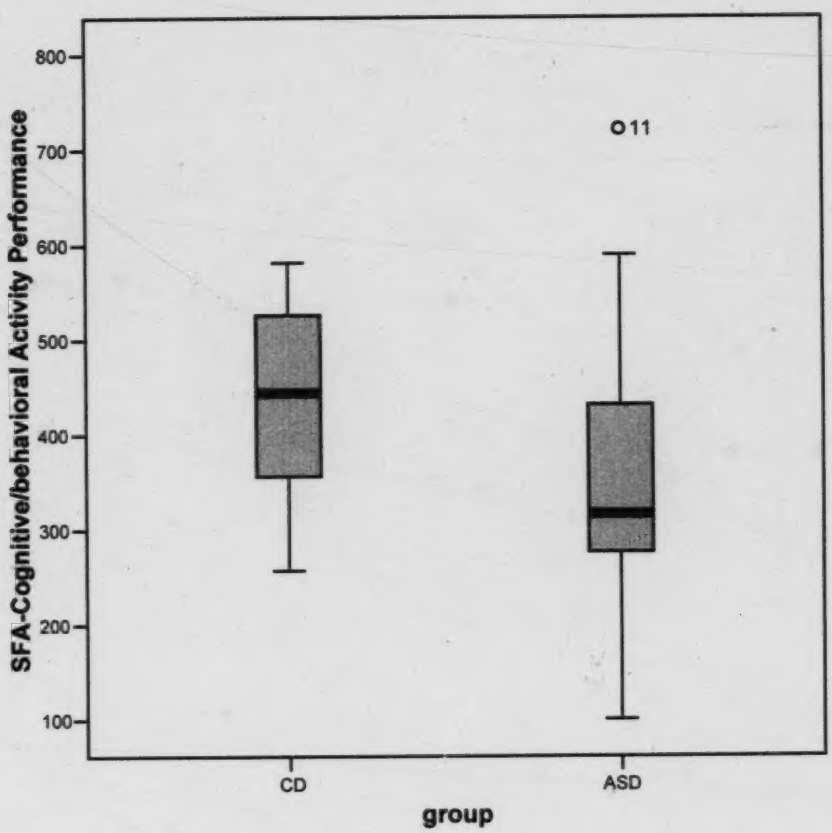
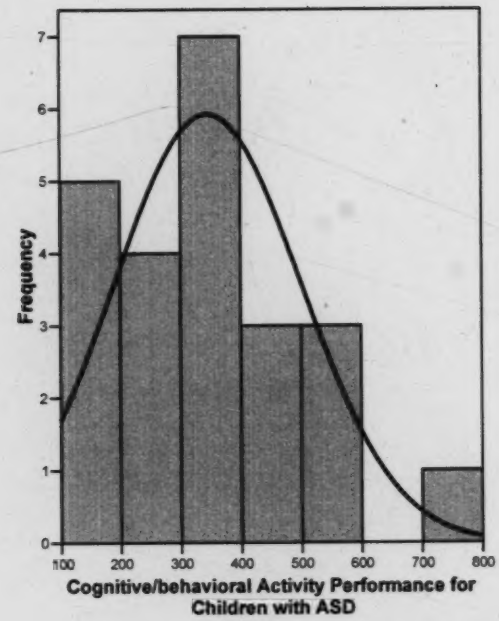
40
60
80
100
120
Cognitive/behavioral Tasks Supports for Children with CD

APPENDIX T:

BOX PLOT AND HISTOGRAM: COGNITIVE/BEHAVIORAL TASK PERFORMANCE

Appendix T: Box Plot and Histogram: Cognitive/Behavioral Task Performance




Frequency
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200
300
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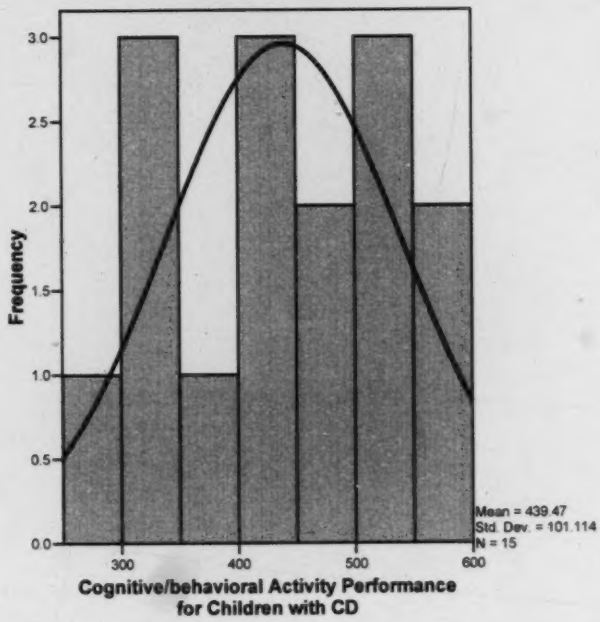
500
600
700
800
Cognitive/behavioral Activity Performance for Children with ASD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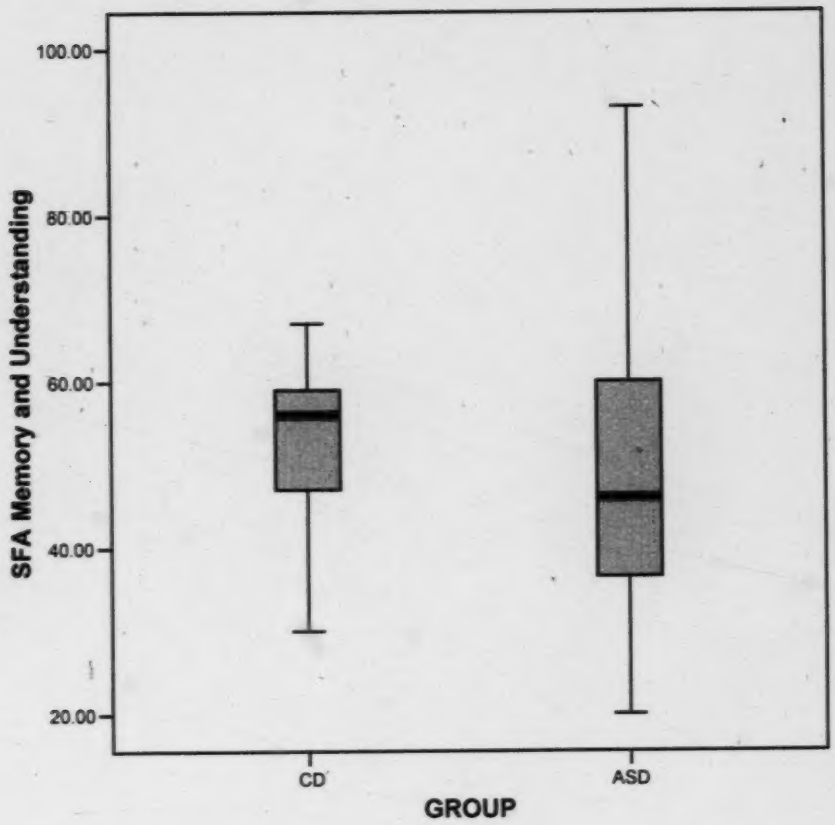
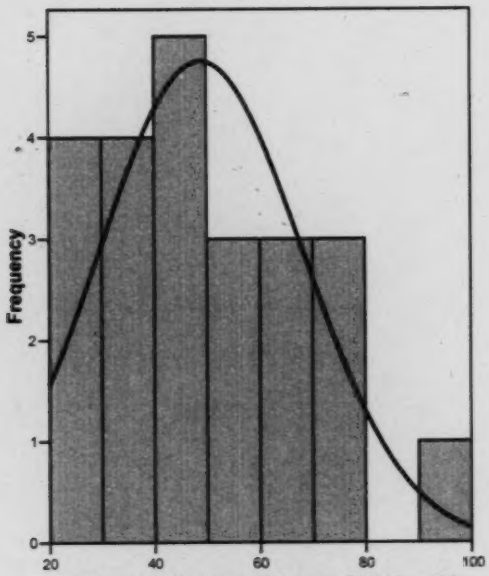
0.5
1.0
1.5
2.0
2.5
3.0
300
400
500
600
Mean = 439.47
Std. Dev. = 101.114
N = 15
Cognitive/behavioral Activity Performance for Children with CD

APPENDIX T:

BOX PLOT AND HISTOGRAM: MEMORY AND UNDERSTANDING

Appendix U: Memory and Understanding

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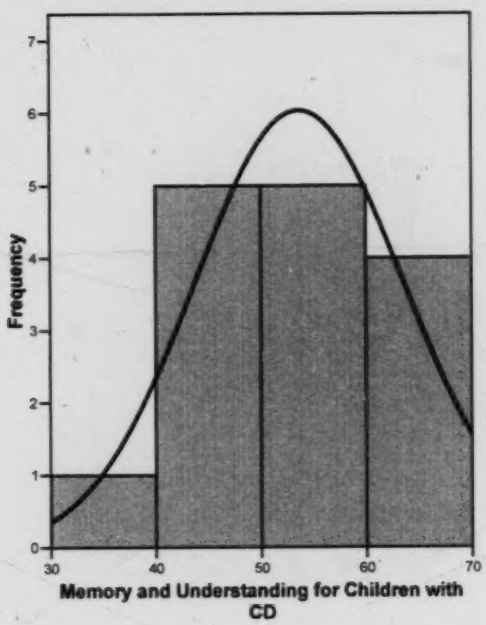
2
3
4
5
20
40
60
80
100
Memory and Understanding for Children with ASD


Frequency
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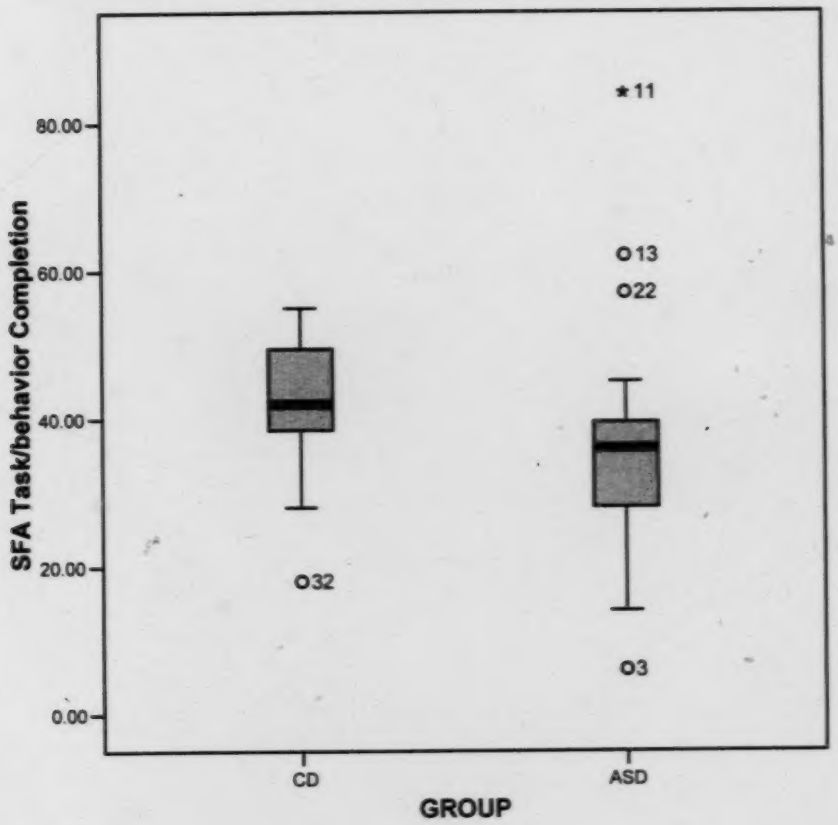
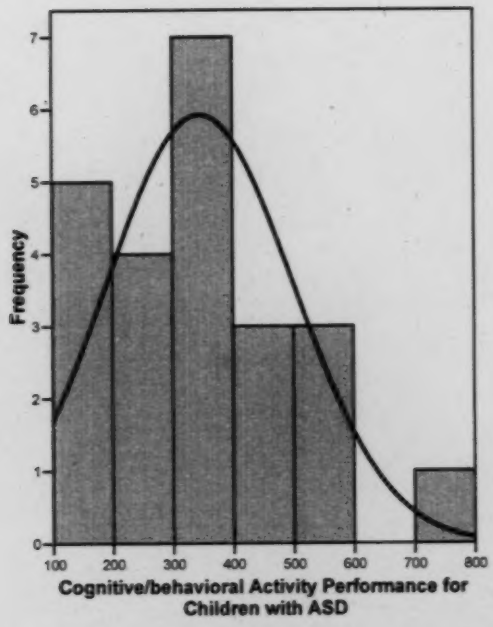
1
2
3
4
5
6
7
30
40
50
60
70
Memory and Understanding for Children with CD

APPENDIX U:

BOX PLOT AND HISTOGRAM: TASK BEHAVIOR/COMPLETION

Appendix V: Box Plot and Histogram: Task Behavior/Completion




Frequency
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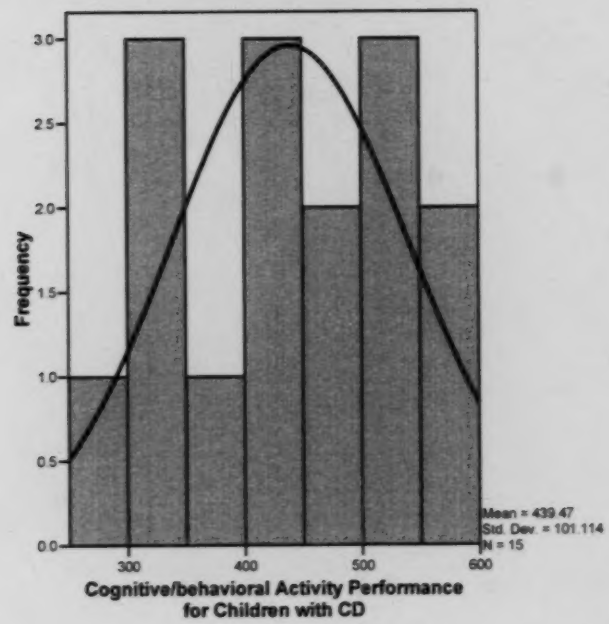
2
3
4
5
6
7
100
200
300
400
500
600
700
800
Cognitive/behavioral Activity Performance for Children with ASD


Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
300
400
500
600
Mean = 439.47
Std. Dev. = 101.114
N = 15
Cognitive/behavioral Activity Performance for Children with CD

APPENDIX V:

TEACHER INTERVIEW SUMMARIES

Appendix R: Teacher Interview Summaries

Teacher #1: Pilot Study

Background: BEd in elementary education, with a minor in special education, currently working on a Master's degree. Seven years experience in special education, six years working with children with ASD

Program: Classroom for children with ASD, large urban jurisdiction

#1 How much time
- SFA – 90-120 minutes

#2 Was the SFA useful
- SFA had more questions than the VABS-C
- More of the questions were relevant

#3 Which parts of the SFA were more relevant
- Not asked

#4 Which instrument provided more information
- Prefers the SFA

Comments:
- SFA doesn't give credit for skills the student has
- Doesn't reflect scatter skills
- On a lot of items "they're (students) not there yet, they may have the foundation"
- Need more in-between stages
- "Misses what they can do or those skills where they are partially there"
- Completion of the SFA is time consuming

Teacher #2

Background: BEd in elementary education. Six years teaching special education

Program: Congregated Special Education or children with cognitive delays (including children with ASD)

#1 How much time
- SFA – 120 minutes, time consuming took a full day for the first student
- VABS- 1 hour

#2 Was the SFA useful
- Yes, very useful
- Rating system worked fairly well
- So many levels what may be working for one child may not be working for the other child
- Broke things down even further

#3 Which parts of the SFA were more relevant
- Task supports provided additional information amount of assistance or how it could be with drawn

#4 Which instrument provided more information
- Vineland is straight forward doesn't deal with task supports and the level of support
- Prefers the SFA

Teacher #3

Background: BEd, with special education major, ECS minor, currently working on a Master's Degree. One assessment course. 16 years teaching experience

Program: Congregated Special Education classroom in a "magnet" school for children with disabilities.

#1 How much time
- SFA – 60 minutes
- VABS- 45 minutes

#2 Was the SFA useful
- Yes

#3 Which parts of the SFA were more relevant
- Cognitive/behavioral sector

#4 Which instrument provided more information
- SFA

Comments:
- Presentation of SFA was easier to follow
- Descriptors (rating system) were helpful

Teacher #4

Background: BEd, with a focus on special education. No assessment courses. 8 years teaching experience

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities.

#1 How much time
- SFA – 30 minutes
- VABS- less than 30 minutes

#2 Was the SFA useful
- Things were more applicable to my level of child
- Liked the way it was broken up between assistance and adaptations

#3 Which parts of the SFA were more relevant
- Nothing stood out
- Could be used to develop IPP

#4 Which instrument provided more information
- SFA more useful than the Vineland

Teacher #5

Background: BEd, 20 years teaching experience, 12 years special education

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities.

Type of class: Congregated Special Education

#1 How much time
- SFA – 90 minutes
- VABS- 45 minutes

#2 Was the SFA useful
- Useful

#3 Which parts of the SFA were more relevant
- Cognitive behavioral

#4 Which instrument provided more information
- SFA could be useful developing an IPP

Teacher #6

Background: BEd, special education minor, 1 or 2 courses in assessment, 3 years of teaching

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities.

#1 How much time
- SFA – 45 minutes
- VABS- 15-20 minutes

#2 Was the SFA useful
- Useful

#3 Which parts of the SFA were more relevant
- Participation

#4 Which instrument provided more information
- SFA could be useful developing an IPP

Teacher #7

Background: BEd with a special education focus, teaching for three years

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities in urban/rural area.

Type of class: adolescents with severe/profound disabilities. Children primarily low functioning.

#1 How much time
- SFA – 60-90 minutes
- VABS- 60 minutes

#2 Was the SFA useful
- SFA was better than the VABS

#3 Which parts of the SFA were more relevant
- Part III (activity performance) was easiest to fill out
- Cognitive behavioral was more difficult (because of the level of the kids).

#4 Which instrument provided more information
- Preferred the Vineland. The Vineland provides an age range, which is helpful. Like the SFA, however, because it included more items that relate to the school.
- Familiar with a lot of the information on the SFA probably because has access to specialists

Teacher #8

Background: BEd in elementary education with a minor in Special Education. Teaching for 3 years. No courses in assessment.

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities in urban/rural area:

#1 How much time
- SFA – 120 minutes
- VABS- 90 minutes

#2 Was the SFA useful
- Yes
- But needed to space the SFA over two days because of the amount of information

#3 Which parts of the SFA were more relevant
- Has to sit down and think about where they (the student) was at
- Cognitive behavioral was most useful
- Helped to focus on areas outside of academics

#4 Which instrument provided more information
- Unsure although the likes that the VABS allows for estimated performance

Teacher #9

Background: BEd in elementary education with a major in Special Education. Has one course in assessment

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities in urban/rural area

#1 How much time
- SFA – 120 minutes, time consuming took a full day for the first student
- VABS- 45 minutes

#2 Was the SFA useful
- Yes, very useful
- Knew where the kids were at (after completing the SFA)
- Broke things down even further

#3 Which parts of the SFA were more relevant
- Cognitive behavioral was most useful

#4 Which instrument provided more information
- The SFA for sure
- Provided information that could be used on an IPP

Teacher #10

Background: BEd , MEd in psych and assessment 17 years experience in Special Education

Program: Program: Congregated Special Education classroom in a "magnet" school for children with disabilities in urban/rural area

#1 How much time
- SFA – 180 minutes
- VABS- 90 minutes

#2 Was the SFA useful
- Provides good starting points
- Best if the child was new to you and you were just starting a program

#3 Which parts of the SFA were more relevant
- Physical tasks were well defined
- Cognitive/behavioral requires more interpretation

#4 Which instrument provided more information
- Vineland is familiar and takes less time
- Get more useful information from the SFA

Teacher #11

Background: After degree Bachelor of Education, over ten years teaching experience

Program: Congregated special education program for children with cognitive delays.

#1 How much time
- SFA – unsure but estimated 120 minutes
- VABS- 60-90 minutes

#2 Was the SFA useful
yes
#3 Which parts of the SFA were more relevant
- Cognitive/behavioral components could lead to IPP goals

#4 Which instrument provided more information
- SFA

The tie to curriculum is not as strong as it could be.

Teacher #12

Background: BEd, BPE, first year teaching. No special education training. No classes in assessment

Program: Congregated classroom for children with ASD located in a large urban area

#1 How much time
- SFA – 60 minutes
- VABS- 30 minutes

#2 Was the SFA useful
- Whole thing was more appropriate

#3 Which parts of the SFA were more relevant
- Cognitive/behavioral components could lead to IPP goals
- Participation and task supports were appropriate

#4 Which instrument provided more information
- SFA more specific to the needs of the kids
- SFA more user friendly
- Vineland doesn't have enough items

Comments;
- Doesn't take less time as she went through

Teacher #13

Background: BEd, with special education major. One assessment course. 3 years teaching experience

Program: Tipaskan School

Type of class: Congregated Special Education

#1 How much time
- SFA – 120 minutes
- VABS- 45 minutes

#2 Was the SFA useful
- Could be useful for IPP development

#3 Which parts of the SFA were more relevant
- Cognitive/behavioral components could lead to IPP goals

#4 Which instrument provided more information
- Vineland easier
- Social interaction items on the Vineland useful e.g. games

Comments:
- "Huge" physical portion doesn't apply

Teacher #14

Background: BEd, with early childhood major. 15 years teaching special education

Program: Congregated Special Education classroom for children with cognitive delays located in large urban area.

#1 How much time
- SFA – 60 minutes
- VABS- 30-45 minutes

#2 Was the SFA useful
- SFA was more appropriate
- Covers more classroom tasks

#3 Which parts of the SFA were more relevant
- Talks a lot about assistance
- Cognitive/behavioral components could lead to IPP goals
- Physical tasks are good because it is important for them (child) to learn.

#4 Which instrument provided more information
Prefer the SFA for sure

APPENDIX X:

LIST OF ITEMS FROM THE SFA FUNCTIONAL COMMUNCATION SUBTEST

Appendix X: Items from the SFA Functional Communication Subtest

Response Items from the Functional Communication Subtest of the School Function Assessment*

1. Communicates yes/no, acceptance/refusal, or choice between 2 or more items.
2. Communicates "hungry" or "thirsty".
3. Communicates "sick", "hurt", or "help".
4. Communicates need for help with a functional (nonacademic) task (e.g., toileting, opening a container).
5. Communicates first and last name.
6. Communicates where something is located in the classroom or school.
7. Communicates short messages to another person.
8. Communicates inquiries/requests for information.
9. Communicates short messages from one person to another (e.g., teacher to principal).
10. Communicates safety information.
11. Describes an object well enough for correct identification.
12. Communicates where he/she would go or what he/she would do if lost (e.g., on school trips).
13. Communicates complex (3 step) directions to others.

*Children are rated on a 1-4 scale with 1 indicating "Does not perform" and 4 indicating Consistent performance. Any established method of communicating (e.g., verbal, sign, writing, communication board).